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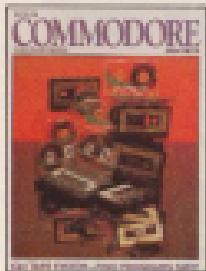
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REGULARS

- *Data Statements*
- *Game of the Month* 10
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- *Byting into the 6510* 13

Learn how to add an interrupt driven cursor to our typewriter program

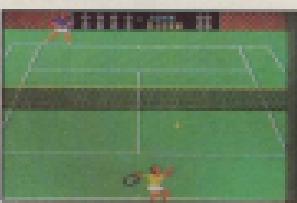
- *Sprite Library* 32

This month we look at sprites in the form of vehicles

- *Bothersome Basic* 38

Continuing our series, this month we look at the INPUT command

- *Games Reviews* 41



Re-Cast Games

- *Teacher's Pet* 47

- *Competition* 50

Your chance to win the revised Korgis joystick

- *Software for Sale* 63

- *Listings* 75

- *Back Page* 106

COM
C64
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FEATURES

- *Basic*
- *Commodore*
- *Hardware*
- *Business*
- *Therapy*
- *Free*

UPDATES

- *8080*
- *PC*
- *Commodore*
- *VIC*
- *Laser*
- *CD*
- *Quake*
- *Turbo*
- *M68000*
- *IDE*
- *Amiga*
- *Logitech*
- *ESX*
- *CD-ROM*
- *Printers*
- *chips*
- *Units*
- *Graphics*

- *Apple*
- *Commodore*
- *Windows*
- *Commodore*
- *PC*
- *Printers*
- *graphics*

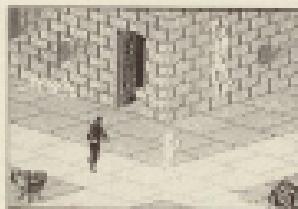
FEATURES

- **BobsTerm Pro** 29

Could this be the ultimate communications package?

- **Best Buys of 1987** 71

The best games from '87



Mr Lee Plays

UTILITIES

- **80 Character Printout** 16

Produce 80 columns per line with your C64

- **Controlling the 80 Columns**

- **Video Display** 18

Learn about the capabilities and limitations of VDC

- **Questionnaire I** 21

Test the IQ of your friends with this fun program

- **May I Interrupt?** 23

Discover the world of interrupts

- **Ackroyd's Sage** 29

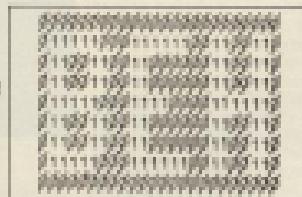
Learning tables with your computer

- **Enlarging the C64** 53

Produce enlarged characters by creating

User Definable

Graphics



See Column 53

- **Array Display Subroutines** 61

Create a screen input and display routine which acts on string arrays

- **C64 Tape System** 68

Provide a tape driven access to multi-program library

**VOLUME 4
NUMBER 4**

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DATA STATEMENTS

YES PRIME MINISTER

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Sport for All

Electronic Arts has recently released a whole host of sports games for the C64, so here's a quick run down of what's available.

Skate or Die is on C64 cassette (£9.99) and disk (£14.99). It's a skateboard simulation in which you have to compete in five different competitions. The contests are modelled on real championships and feature events like Ramp Freestyle, Downhill Race and Ram Hill Jump. *Man-Put* for the C64 (cassette £9.99 and disk £14.99) is a crazy golf game in which nothing is ever normal. A smooth green can suddenly come to life and gobble your golf ball!

Top Gear is a driving simulation which lets you experience the thrill of driving some of the world's top cars including a Ferrari Testarossa and a Lamborghini Countach. This simulation displays the interior of the

car and the road to give the feel of a real test drive and the object of the game is to drive sections of the road within a given time limit.

Free Drive is available for the C64 at £9.99 cassette and £14.99 disk and is also out on the Amiga at £14.99.

Commodore has announced the release of an Amiga Sports Pack and a Commodore 64 Sport Pack. Each pack contains an assortment of sports games, a full size carry bag and a "Win a day at Chelsea" competition.

Timothy:

Electronic Arts: Langley Business Centre, 14-18 Station Road, Langley, nr Slough, Berks, SL1 1PF. Tel: 075 45442.

Commodore Computer House, The Strechwick, Gardner Road, Molesey, Surrey KT8 7LA. Tel: 081 770088.

Television Tie-ins

There has been a sudden spurt of TV related titles in the last few weeks.

First, *Mosaic Publishing* is launching *The Prime Minister*, a game based on one of the most popular comedy programs of recent years.

The player takes the part of Jim Hacker and must raise his standing in the polls during five days of turmoil and crises.

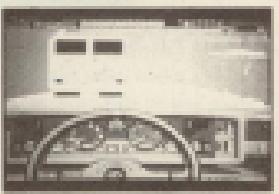
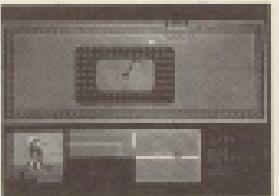
The game is available on C64 cassette at £14.99 and disk at £19.99.

TV games, *Dosmark*'s new label, has announced the launch of three new titles for the C64. All based on popular television shows, the games are *Cashpoint*, *Bulldogs* and *Treasure Hunt*, and all feature many of the familiar aspects of their counterparts on the box. All sell out £7.99.

Timothy:

Mosaic Computer Firs, South Cadeby, Loughborough, Leics LE9 2PL. Tel: 0125 379555.

Dosmark: Dosmark House, 22 Mansfield Road, Westcliff-on-Sea, Essex SS9 1TA. Tel: 01 947 3422.



DATA STATEMENTS

Generally Speaking

The UK's first Technology Graduate Recruitment fair is to be held at the Marconi, Birmingham, 8-9 January 1989.

Chris Boos, of organisers Inter-UK, said: "Since launching the fair, we have been very pleased by the initial take up of stands." Companies committed to appearing include Barclays Bank, IBM, Dow Chemical, Thames Water Authority and Rank Kerrs.

Exhibitors are hoping to attract graduates with technology and computing backgrounds at the specialist event.

Also relevant to those interested in computers is the Data Protection Act 1984. The final elements of the Act came into force on November and will affect everyone in the UK.

For the first time, every man, woman and child has the legal right to see what is held on computer files about themselves and where appropriate to have the information corrected. It also gives individual the right to compensation under certain circumstances.

Lives can be seriously affected if inaccurate data is held about individuals. For instance, even worthlessness could be undermined or employment prospects blighted.

For further information about the Act and your rights under it, contact the Office of the Data Protection Registrar at the address in Tooting, London.

Office of the Data Protection Registrar
Springfield House, Water Lane,
Woolwich, London SE18 5JL. Tel 0181 5257511.

In the Arcade

Dosmark, always on the lookout for big licensing deals, has just released a £94 version of Star Wars. The game is a conversion from the original licensed Atari game and bears a close resemblance to it.

To select your intergalactic level and then you're placed in charge of an X-wing fighter and are ready to fight the forces of the evil Darth Vader. The C64 cassette version is £9.95, and the disk version is £19.95.

Amiga News

The Amiga 300 has been reduced in price by Commodore to £489.99 including VAT. The announcement came recently after weeks of speculation over the pricing of the Amiga 300, the smallest machine in the Amiga range.

Bundled with the computer, and inclusive in the price, are *Before Power* from Electronic Arts and *The Key* first tutorial pack.

Tom Hart, National Sales Manager Consumer Products Division, said: "We believe that 99.9% inclusion of VAT offers a significant incentive to the consumer during the Christmas period and the months ahead. This is the only price change both are for the remainder of 1987 and for the foreseeable future."

Software is still being launched thick and fast for the Amiga range, a large percentage coming from US companies. Electronic Arts is no exception, having recently announced the arrival of four new Amiga products.

Three of these are musical: *Audion Music* (£24.99) allows users a means to compose and play in improving sounding pieces. The program uses a non-standard form of musical notation which, it is claimed by EA, is exceptionally easy to read and a remarkable user interface to make creating music as easy as possible. Not well known Music ever let the user play out of tune or out of rhythm.

The other two offer musical products as library disks to accompany *Audion Music*. These are *It's Only Rock 'N Roll* and *Rock and Cool Jazz*. Both will retail at £9.99.

The fourth EA Amiga release is *Earl Weaver Baseball*, a sports simulation written by two top

baseball managers Earl Weaver and Eddie DiGiulio.

The arcade mode of the game is a challenging, sophisticated simulation which features high resolution graphics and realistic digitised sound. However, there is a major strategic element to the game, in that players can step into the manager's shoes to set line-ups, trade and draft players, pack pitchers and choose a range of opponents including Earl Weaver himself. Players also get the chance to design their own baseball park. The game is priced at £24.95.

Sentinel Software has announced a price reduction for the *Word Perfect Amiga* word processor. Formerly £25, the program will now sell at £19.95.

Sentinel is also continuing its trade-in offer to Sinclair owners. Anyone currently using Scrabble can obtain a £20 refund off the cost of *Word Perfect Amiga*. Simply send your old master disk and manual with a copy of your invoice for *Word Perfect Amiga* to Sentinel Software at the address on Touchline and you will get a £20 refund.

Touchline

Commodore Computer House, 104 The Quadrangle, Grindley Road, Headingley, Leeds, LS9 2JU. Tel 0113 262 6620/262 6621.

Electronic Arts, Langley Business Centre, 11-19 Langley Road, Langley, New Slough, Berks, SL1 9PA. Tel 0175 492442.

Sentinel Software, Wellington House, New Zealand Avenue, Wintonnes-Blair, Sowerby Bridge, BD17 7PT. Tel 01274 55104.



DATA STATEMENTS

Richard Mason, Managing Director of Superior Software goes to grime and Researcher.



Diamond is also planning future games based on the films *The Empire Strikes Back* and *The Return of the Jedi*.

Octopoli is a new arcade game from English Software. Set in the year 2007 the small planet of Octopoli is faced with the might of the Imperium. Luckily a secret weapon is available, enormous mental power. No enemy ship could approach and expect its crew to remain sane and sensible.

However the Imperium secret service has been trying to find a space pilot who would penetrate the zone around the planet and find a way through, so that Octopoli could be napped up. Now a hero has been found and it's you.

Game features include split screen two way perspective viewing, 40 detailed play areas and sound effects to match. It costs £2.99 for C64 cassette and £12.95 for the disk.

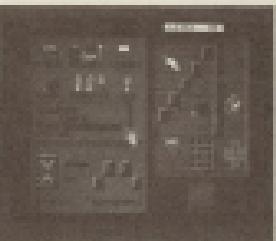
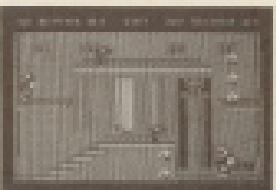
Imagine has released Freddie Hardboiled, an arcade action game for the C64 (£2.95 cassette and £12.95 disk). The game originated from Spanish software house Diamond.

Freddie Hardboiled is a counter-espionage agent, skilled in martial arts and laser weaponry. However, Freddie habitually drinks too much and one night manages to crash his space ship on an exotic planet. The only way to an escape is to hijack an enemy space ship without being killed by barbiturate mutants, immune to laser fire.

Microsoft has released a new Terry Crowther game for the C64 on disk (£12.95) and tape (£9.95). The game is called *Zig Zag* and is set in the fourth dimension. As a trainee space pilot, you must face the ultimate challenge, the Matrix of Zig. Created to find the supreme space pilot, it has yet to fulfil

its purpose. Your aim is to find the eight artefacts of Zig and escape to what lies beyond the Matrix.

As an incentive to would-be super-pilots, Microsoft is offering a photo-blaster signed by Terry Crowther to the



first five players who finish and discuss the code on the hi-score table.

Superior Software is also offering prizes to accomplished game players. Researcher is Superior's new arcade adventure for the C64 (£9.95 cassette and £11.95 disk) and the Amiga (£14.95). Rono is a baby dragon who runs a bath house in the depths of the sea for visitors fed up of stagnant water. Unfortunately, the bath attract some undesirable, who love to eat baby dragon meat.

The competition can be won by anyone who finished the game. Each player who completes Researcher successfully can claim a portable radio complete with headphones, a Home badge and a winner's certificate.

In *Out of the World*, on the Reaktion label, you (Claude Harrois) and your C64 (as SP246 fighter jet) save yourselves in *The Outer World* and have to negotiate eight levels, seven bonus levels and hostile energy ships in order to make the enemy surrender. The game is available on cassette and disk at £9.99 and £11.99.

Electronic Arts has launched Devon Stalker, a one or two player arcade game for the C64.

Devon Stalker contains 99 levels of amazing maze, all with different goals, messages, encounters and escape. And level 100 contains Calcrak, the Devion, ready to battle with unexpected intruders. On each level are many useful items, but you have no way of knowing if they are good or evil so be prepared to take risks. The cassette version of the game is £9.95 and the disk version costs £14.95.

Touchline:

Diamond Research House, 27 Marshfield Road, Wimbleton, London SW19 7JZ. Tel: 01-867 5621.

English Software, 1 North Parade, Farnham, Surrey, M2 3NU. Tel: 041 823 1238.

Imagine, 6 Coombe Street, Manchester M2 3NS. Tel: 061 824 1019.

Microsoft, Ashton House, 10-12 Step Lane, London EC1P 4AB. Tel: 01 377 4077.

Superior Software, Regent House, Skinner Lane, Leeds, LS7 1AS. Tel: 0532 435433.

Reaktion, 7 Duxell Road, Finchley, London NW3 2DN. Tel: 01-765 4260.

Electronic Arts, Langley Business Centre, 11-19 Station Road, Langley, Nr Slough, Berkshire SL3 8LN. Tel: 070 434422.

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Solid Gold

Go for gold in the lowest in game compilations.

By Tony Hetherington

Compilations come and go and offer you a gaggle of goodies for the price of one game. They usually consist of one chart tapper, two action games and a few utilities. So the usual advice from review writers of a few years' ago is just the good game. Now U.S. Gold has changed all that with Solid Gold, a compilation of five

great games. Now the advice is simple - buy it!

Gambit leads the impressive line-up that also includes the combat flight simulator *Ace of Aces*, the original version of Leader Board, the best of the "event" sports games, Winter Games, and Infidels in which a flight simulation, commando game and

arcade adventure all rolled into one.

Gambit took the expected Christmas number one spot and is the successor of the classic coin-op machine that was so popular that a slot for 50 coins was specially fitted so players could cash in their money. The C64 version re-presents the excitement of the battles of a warbird





wizard, elf and sorceress (both of them) against ghosts, giants, robbers, werewolves and the aptly named death as they bravely delve deeper into the dungeon.

A staggering 512 levels packed with monsters and mazes lay ahead as they search for treasure, keys to open doors, magic potions, amulets of levitation and food to top up their health points. As monsters march on and poison drain you then the health points are lost. More out of health points and you run out of game.

Gathering a following for your game that's played in a state of semi-controlled game by players that never know, are hooked for hours and hours. Undoubtedly, the peak of the computer comedians.

Are of Assassins sent to the skies in the pilot seat of a Mosquito fighter bomber. The game begins in the briefing room where you can choose to bomb a POW camp carrying prisoners to Berlin, attack submarines, believe it's escape to the open sea, deliver V1 rockets from their deadly course to London or delight with a squadron of 100%. If you want to become the Are of Arms you will have to arrange all four at once!

Once airborne you certainly have your work cut out as you have to plot your course so that target control both airbase, aerial defence guns, rockets and bombs weapons and fight off attacking MiG 109s.

Leader Board was the first of a series of four golf games from Access, the people who brought you addictive games such as the stunning Beach Head II and Raid over Moscow. Despite the lack of shade and killing the normal Access trademarks the Leader Board courses can be vicious particularly to novice golfers.

Unlike other golf simulations that provide their clubs selection and fine angles Leader Board is a LOAD AND go game.

Hit and hope tactics seem to work as well as any other which makes it a real gamers players' game which probably explains why it shot straight into the number one in the charts.

The courses are a bit limited and consist of islands set in a massive lake so if you manage to stay out of the ditch you'll probably get a good score. If you enjoy Leader Board then it's probably worth investing in one of its three sequels. Leader Board Tournaments added four new but equally wet courses, the Invasion version dredged out the course and added trees and bunkers and finally World Class Leader Board is the definitive version complete with a topdown map of each hole.

Winter Games has the third in the firm's "Games" series that begins with Summer Games 1 and 2 and has now continued with World Games and recently California Games. Winter Games, another chutzpah copper, is still my favourite.

Cooling events push joystick athletes to their limits as they go for gold in the ice and snow.

Superb graphics from the

backdrop for events such as the ski jump and bobbed as well as the curious Hot Dog Arch in which contestants must perform acrobatics while leaping off a ski slope! Skating comes in the three varieties of speed, figure and free but the most grueling event has got to be the biathlon. This is a cross country race against time in which you must also shoot targets to get a good score and a chance of a medal. After the biathlon, the chutzpah will be gone.

Last but no means least Infidellous sends you as Johny "Hunks-Baby" McGibbons as you set off in your super helicopter to save the world once again. This time the Mad Leader is up to his old tricks again and you must stop him.

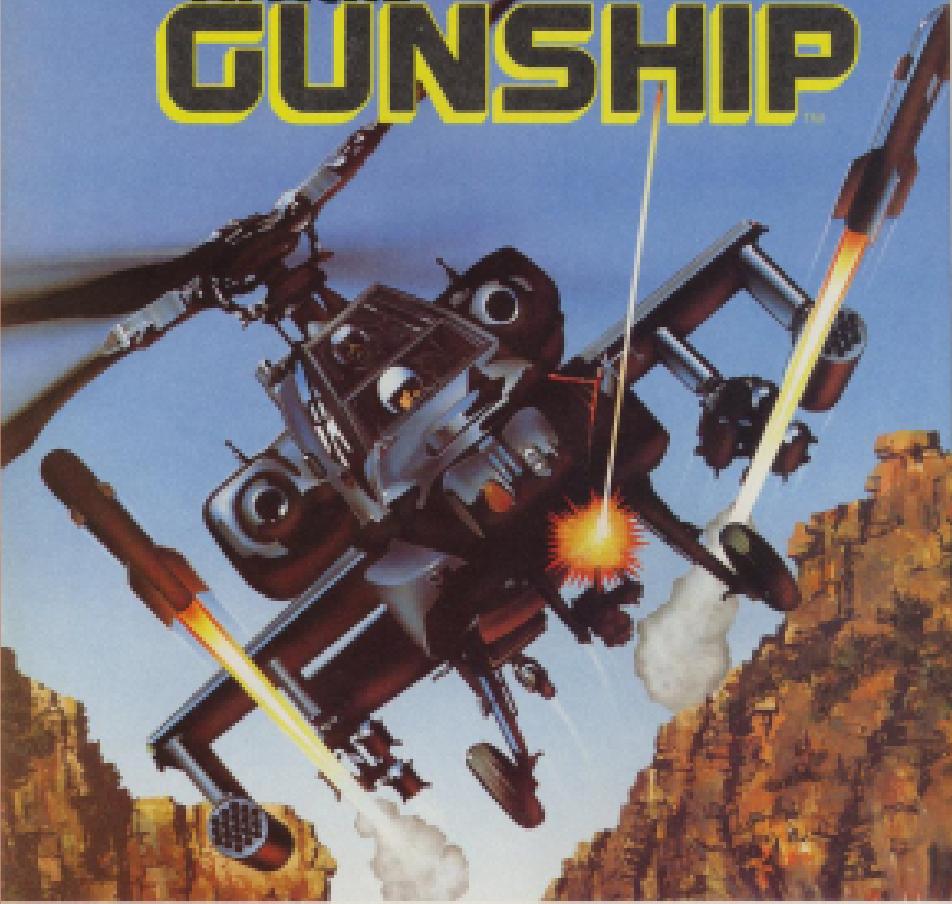
In the first of three missions you must fly your Whirlybird Entomos Glacis Attack helicopter through enemy airspace then land and infiltrate the enemies base. With only your usual load of sleeping gas, fake papers and gas grenades you must search the base and photograph the Mad Leader's plans and then escape back to base. This mission leads you through a combat simulation to a commando-style assault adventure and back again in one amazing game.

Each of these games is a classic in its right but together for only £9.99 they are pure solid gold.



Assassins
Title: Solid Gold Supplier: D.J. Gold.
U.K.: Hartfield Way, Hartfield, East Sussex TN2 5EP. Tel: 070-558-1582. Machine: C64 Price: £9.99. Rating: 8/10. Playability: 10/10. Graphics: 9/10. Value: 10/10.

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No.

Byting into the 6510

This month we continue our typewriter program in machine code by adding an interrupt driven cursor and find out more about the machine stack.

By Burghard-Henry Lehman

Finally, I consider the most exciting thing about computers is their tremendous flexibility. Even though they are only machines, they are the most versatile kind ever invented. This opens the way for unlimited creativity, and at the end of the day, a computer is as good as what you make of it.

For example, you may be forgiven for thinking that since you bought yourself a Commodore 64 you are condemned with a slow and pretty limited basic for ever. But the moment you learn something about how flexible the machine really is, you'll find that this is only the tip of the iceberg. The deeper you get into the C64, the more you will discover that it has been designed in ways which literally beg you to make more out of it. In the end you could change your computer so completely that you could have a brand new computer every week! And this is not really as difficult as you might think. In fact, the designers of the C64 made sure of that in several ways.

In the following article we will discover a powerful way of changing your C64 considerably: the use of vectors.

Vectors

In the last article in this series I told you a little about the maskable interrupt which is called upon every fifth of a second and enables the computer to read the keyboard and print the flashing cursor. Now we want to use this knowledge and create our own cursor.

First of all, let's look at exactly what happens every fifth of a second:

Each time the interrupt is called the microprocessor is made to jump to the last location of the C64 which is hex FF14 or decimal 4032. Actually, it's not really jumping to this address, but using this uppermost location to find out where to jump instead. You might like to know that all processors of the 6500 family, to which the 6510 belongs, are programmed to read the vector at \$FF14. But from there all machines take different routes.

So this is what a "vector" is all about. It is very similar to what we have already learned when dealing with indirect addressing—the contents of two locations point the microprocessor to the address of another location.

The vector at the top of the C64 tells the 6510 to jump to a routine at hex FF48, decimal 4032. This is the start of the interrupt routine and begins with the 6510 saving the contents of all its registers and so afterwards, it can continue with whatever it was doing before. It is then made to jump via another vector.

This vector is located in RAM, at hex 0314 or decimal 792, and tells one who concerns us most. Because it is located in RAM we can change it and thus make the 6510 jump to our routine, instead of the usual routine at \$0301.

Driving a Wedge

Vectors are very useful because they provide flexibility in the design of a micro. When a computer first comes onto the market the operating system is seldom as fully developed as hoped. There are very often bugs present (the

people who program the operating system are just as fallible as the rest of us...). It is also very likely that the designer comes up with ideas for improved facilities.

Without vectors those changes in the operating system would mean that the whole program would have to be rewritten completely. It would also mean that some of the hardware of the computer might have to be redesigned and this would result in a lot of very unhappy people who have spent their hard-earned money on a brand new micro, only to find themselves within a very short time lumbered with a machine which is hopelessly out of date. This problem can be solved by using vectors which are fixed locations, either in RAM or in ROM. All that has to be changed now is the contents of the vector location, which makes the microprocessor jump to the new or modified routine.

Vectors are also very useful to the home programmer. If a vector is in RAM, he can change it and make the microprocessor jump to his routine instead of the one in the operating system. This is called "driving a wedge", and is used by all the extended BASIC programs available for the C64.

We will also use this method, for programming our own cursor.

Turning the Cursor On

The interrupt routine which I have run into a separate source file (chapter 20—see listing 2) consists of three routines:

- the routine, which turns our cursor on,
- the routine, which turns it off.

MACHINE CODE PROGRAMMING

* the interrupt routine itself, which is called upon every 60th of a second via the vector at \$0014.

"Turning the cursor on" could sound a little misleading, as we don't reflect from anything on or off. All we do is change the vector at \$0014. But for our purpose this means, that from then on our cursor is "turned on", in the sense that the computer will now jump to our routine instead of the one in Kernel ROM, which is located at \$E0A1.

Later on, when we "turn the cursor off", we will do the opposite, i.e. change the vector back to normal.

As you can see from lines 230 and 250 (and 238 and 258, respectively), I have introduced two new opcode mnemonics: "SETI" and "CLTI". You may remember that in the last article I said that we are dealing with a "maskable interrupt", that is an interrupt which can be turned on and off by software.

This is exactly what "SETI" and "CLTI" do: "SETI", which stands for "Set Interrupt flag", enables the interrupt. "CLTI", which stands for "Clear interrupt flag", disables it. The interrupt flag is bit 10 of the flag register of the 6510. If this flag is clear (0), the microprocessor executes the interrupt every 60th of a second. If it is set (1), it doesn't.

It is very important to disable the interrupt while we make the 6510 change the vector. Remember, in the time which it takes you to read lines 160 to 190 in our program listing, the 6510 will have called the interrupt at least sixty times! So it could easily change part of the vector at \$0014 and then jump to the interrupt, using the same vector which it has just partially changed. This would result of course in it jumping to somewhere quite nonsensical! And this, in all likelihood, will mean a complete crash!

So we have to prevent the 6510 from following the interrupt while it is changing the vector.

In lines 230 to 238 I note that two variables, "CURSFLAG", and "COUNT", which will be used in the interrupt routine itself. More about this in a minute.

Flashing the Cursor

What does "flashing the cursor" mean? (and I am not thinking of the possibly naughty connotations...) In slow motion it means that there are two states in which a certain

position on the screen can be in the normal C64 mode you either have the character at that position printed normally or in reverse. The flashing effect comes from the machine alternating between these two states.

What happens is very simple - some of the time the interrupt is called, it prints the character normal, while the rest of the time it prints it in reverse.

If it alternated between these two every 60th of a second, it would happen so quickly that you wouldn't be able to see the happen. All you would get at that position is a bad case of flicker.

Therefore we have to introduce a timing device to make it alternate about once a second. This is what the variable "COUNT" is all about, which I introduced in lines 230-238. Of course, by changing the value in "COUNT" you could easily change the timespan to suit your needs!

It starts off with "COUNT" = 0. And every time the interrupt is called, this is bumped up by one (line 238). Then it is loaded into the accumulator and compared with 20 (lines 230-239). If it doesn't equal 20, the program exits straight away to line 980 (JMP \$C-1B) makes it jump to the rest of the normal interrupt routine in the Kernel, which makes it read the keyboard as usual.

If it reaches 20, line "COUNT" is reset to zero (lines 600-601), ready for the next go. Then it tests a variable which I have called "CURSFLAG". This contains either 0 or 1.

If "CURSFLAG" contains zero, the character "under the cursor" is reversed, by adding 128 to it (lines 740-800).

If "CURSFLAG" contains one, the character is put back to normal by subtracting 128 (lines 880-920). (I hope that you are aware, that you can do this with all seven codes, simply by adding or subtracting 128 to it...)

This is all there is to our cursor routine, except that every time "CURSFLAG" is zero, we load it with one and every time it is one, we clear or reset it. Don't think me too pedantic mentioning this little matter, because if you overlook it I can assure you the computer won't! And this will result in the cursor being off most of the time, which means you won't have a cursor!

Turning the Cursor Off

As I've said already, lines 110-190 turn our cursor off by changing the vector at \$0014 back to normal.

I mention this specifically, because if you use your own interrupt routine you should always turn it off, what you don't need it any more!

The first reason for this is that your interrupt routine might slow other operations down, such as loading or saving to disk or tape, especially if your interrupt routine is longer than the one in ROM.

Secondly, it is easy to forget that your routine will indeed be executed every 60th of a second! Therefore, some of the variables which you use in the interrupt routine might be used by the operating system or by the program you are running in the meantime.

For example, if you are the "Speedy Assembler" routine (see for the article plug), you should always turn off any interrupt routines you are experimenting with, before assembling them. And above all, take care to reset all vectors as they are below "Speedy Assembler", like many other programs of this kind, changes some of the registers for its own purposes. If you want to be safe, exit from the assembler, run your program and then re-enter "Speedy Assembler" by typing "S18-22813".

Introducing a Textfile

Having created our very cool cursor (and I hope you will feel free to experiment with different options) we now want to expand our typewriter routine in order to see our cursor working in all its aspects.

Figure 1
SETI=Set interrupt flag
CLTI=Clear interrupt flag
PHL=Pull contents of the Accumulator
PHP=Push contents of the Processor status register
PLA=Pull contents of the Accumulator
PLP=Push contents of the Processor status register

The main program in Listing 1 is similar to my last one, apart from the fact that I've added quite a few facilities to it, which makes our program more like a wordprocessor.

First of all, I have introduced a textfile which is useful for saving the text we have written and also reading it

MACHINE CODE PROGRAMMING

ly, because my routine is not yet complete, I will leave it off, when I have finished it.

What you can do is add other routines, either floating or fixed, especially if they are longer than 16 bytes.

The accepted way to store characters with microprocessors is in ASCII and not in the Commodore screen codes. Printers, including the Commodore printers, know nothing about screen codes, and later on you might even want to send a text file down the line to another computer. ASCII is the standard, and Commodore screen codes aren't.

Having introduced a routine we have of course to take other routines into account. In other words, we are now dealing with two "current positions": one on the screen and one in the textfile! Both have to be updated in concert.

CRSR Left and Right

Since we have now got a cursor, we naturally need to move it! To this purpose I have built a cursor left and right facility into the program. And here I have been more clever than usual! Instead of writing two separate routines I have built both functions neatly into the existing routines.

The idea is simple, if you move the cursor to the right, it is the same as if you enter letters - only without the letters if you get my drift...

On the other hand, if you move the cursor to the left, it is like deleting characters - only without actually deleting anything.

Therefore, cursor right fits nicely into the normal writing routine, while cursor left goes into the deletion routine.

With the cursor moving, the only important thing is, that I don't want the cursor right ASCII-character, which is 20, to overwrite the screen, because this would give me "T", as it happens. So whenever CRSR right is pressed, the program jumps straight to line 1880 where the print position (both on screen and in the textfile) is updated.

For cursor left I had to do some modifications to the deletion routine.

First of all, in lines 1340-1360 I used the X-registers instead of the accumulator to test for the beginning of the screen. This is because I do not want to corrupt the contents of the

textfile, which at this point contains the result of the last keystress.

Then I save the contents of the accumulator by pushing it onto the machine stack (line 1860). (More about this in a minute). This allows me to decrement the print position one to the left, as usual. It sorts me that it moves the character to the right too, because in this way I get rid of the cursor!

Afterwards I pull the contents of the accumulator from the machine stack (line 1880) and give it another test. If it contains 20, then it is the deletion routine, if it contains 25, then it is cursor left, which means that no further action needs to be taken. It jumps straight to the exit in line 1890.

Pushing and Pulling

In the first article of this series I briefly mentioned the existence of the so-called machine stack.

The trouble with the machine stack is, that, like so many others in computing, it is thought of as mysterious, and difficult. In reality it is nothing more than a freebuffer in the computer-RAM (starting at \$0000 or decimal 256 - the next page after memory) which is used for storing pages.

These data-bytes are simply piled on top of the other. This has the effect that the machine stack grows to the end. (Where else should it grow, if you pile things on it?). With regards like this it would of course, not be a very good idea to retrieve items by pulling them from the bottom or the middle. If you do this with a pile of books, you might easily have a nasty accident. Nothing like this happens with the machine stack, but the data-byte you pull is meaningless to the computer.

So, you "push" things onto the top of the stack and you "pull" them back from the top again. The secret of the whole thing lies in the sequence in which you do all your pushing and pulling:

If you push A, B, and then C, and you want then to start pulling things again, the first thing you get is C, B, and finally A. The whole secret of using the machine stack lies in pulling first what you pushed last, and pulling last what you pushed first.

The 6502 actually has a special register - the "stack pointer", which you can program and therefore change the top of the stack, as it is perceived by the computer. But this is something for contestants and kamikaze pilots. You also always have to bear in mind

the machine stack, and whether its proper functioning is vital to the proper functioning of the computer as a whole?

Because every time the 6502 jumps to a subroutine it pushes the return address onto the stack. If, at the end of that subroutine, it can't retrieve the proper address back from the stack, it is well and truly lumbered!

So, if you push something onto the stack, always be sure to put it before you leave the subroutine you are in!

The advantage of using the stack to store things, is that it is convenient and cheap in memory. "PPHA" and "PLA" respectively use only two bytes, and that's half the length you need if you store in a 256x256-page variable. The disadvantage arises if you are not quite certain whether you will have pulled before you exit.

For example, at the beginning of our deletion routine I could have pushed unwisely the contents of the accumulator onto the stack before I tested the screen position in line 1340-1360. But this would result in the stack getting out of order everytime the user presses the deletion key at the beginning of the screen. Because it would then jump straight to the exit in line 1890 and this would mean that there would be no equivalent pull from the stack! This would have created the type of classic machine bug that usually takes days to find.

Unlike other microprocessors, the 6502 allows you to push only two registers onto the stack: the accumulator and the Flagregister. "PPHA" stands for "Push the Accumulator onto the stack", while "PLA" stands for "Pull the Accumulator from the stack". To push and pull the flag register use "PHP" and "PLP" respectively.

And Finally

Everything else in Listing 1 is very much the same as it was last time. I would like to give a special mention to lines 450 and 1860 which turn our cursor on and off and thus activate and deactivate our interrupt routine in listing 2.

I'll leave you with a little something to try for yourself. What about adding a CRSR up and down routine to our program? Here comes the only hint I am willing to give you - you have to add 40 to the screen (and textfile) position for CRSR down and subtract 40 for CRSR up.

See listings on page 77.

80 Character Print Out

Improve the printing powers of your C64 to produce 80 characters per line with this handy program.

By Jens Meyer

This program enables the Commodore 64 to print 80 characters per line instead of the usual 40. It does this by using the graphics screen, and not the text screen. All inputs are diverted to the graphics screen, where the letters are printed in half their normal width. Despite the fact that they are much thinner than normal letters, they are still clear and can be read easily.

The program is written entirely in machine code, but can be loaded normally and started using "RUN".

After loading you will be asked if you want the Epson version - type "N" for no and "Y" for yes. If you select yes, a new version of the program starting at \$2000 will be saved to disk, enabling the user to program an Epson with it later on, if you have the necessary equipment. The Epson has some advantages to the normal version. It is much more compatible with other programs, as it is "Hidden Away" under the ROM and not stored in the basic memory.

However, most users will select "NO". This will start the program immediately and means that you can simply save it to disk or tape with no need to program an Epson, as this

version creates the 80 column display. The Epson option merely exists for a very small minority of people.

When the program is started, the following restrictions and changes occur:

- As the program uses the Hi-Res mode, only one colour can be used at any one time.
- The screen memory map is twice as big as usual because there are twice as many characters, and goes from \$CFFF.
- It is possible to mix upper and lower case letters and graphics because the

graphics mode is being used, and letters which are already on the screen will not be changed, even if, for example (SHIFT)+COMMODORE) are pressed. The new character set is created by using bits 0,1,4 and 8 of the letters of the old character set.

Also, there is a routine in the memory which scrolls up everything on the graphics screen by 8 pixels (one line) to initiate the scrolling upwards in the text mode.

The characters are stored in both the screen memory map and the graphics bit map.

| | |
|-------------|---------------------------------------|
| SC000-SC7FF | NEW CHARACTER SET |
| SC800-SCFFF | SCREEN MEMORY MAP |
| SCF00-ACFFF | ROUTINE FOR SCROLLING |
| SCFFF | GRAPHICS |
| SDCOM-SDFE7 | PRESERVE FORE- AND BACK-GROUND COLOUR |
| SEB00-SFF1F | (SDCOM-SDFE7) IN RAM VERSION |
| SEB00-SFF1F | COLOUR |
| | GRAPHICS BIT MAP |

But enough of all the technical details. If you want your Commodore 64 to have an 80 column display, just

use "ROM 80".

See listings on page 72.

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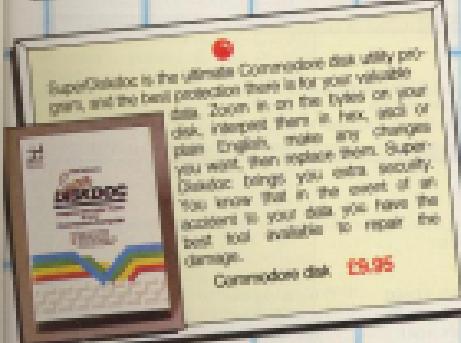


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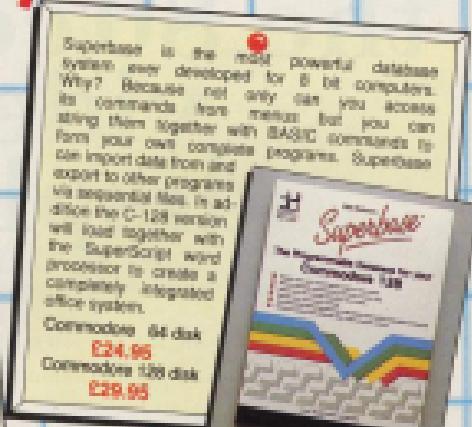


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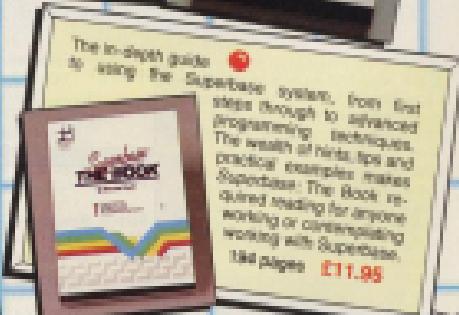
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Controlling the 80 column video display

If you own a C128 and you're eager to know more about the capabilities and limitations of VDC, then read on.

By Leigh Brown

It is useful to have a rudimentary knowledge of Machine Code to some of the operations that the 8503 can perform are not possible in BASIC. Also, it is important to remember that a monitor is needed for 80 columns and some people may not be able to afford the expensive Commodore monitor. I would advise these people to use a standard monochrome monitor.

The VDC has been designed to cater for most of the programmer's needs. For example, it has its own cursor and displays 16K bytes of RAM. However, it has a few drawbacks, but you should get used to these after using the VDC for a while. The first of these is the addressing of the VDC. All of the 27 registers are accessed via memory locations, in the Input/Output area of the computer. These locations are \$D800 and \$D801 and act as simple Input/Output port. For example, to store 15 in register 11, you store 15 at location \$D800 and then store 15 at \$D801. And to read from register 11, you store 11 in location \$D800 and then read the value from \$D801.

Figure 1

| | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 3 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| ALT | RVS | UND | FLA | RED | GRE | BLU | INT |

Figure 2

```
SD808: Read: --- < 8 bits register selected >()
Write: Write: status: Lpnt: VBlank: ----
SD801: Both: < < 8 bits for reading and writing data >()
```

Figure 3

Reading to and writing from registers. Using these routines, X is the register and A is the accumulation byte data.

| | | | |
|-------|------------|-----------------|-----------|
| write | STX \$D800 | /Write register | |
| int1 | BIT \$D800 | /in VDC busy? | ROM COPY |
| | BPL next | /yes, then wait | AT \$D802 |
| | STA \$D801 | | |
| | RTS | | |
| read | STX \$D800 | /Write register | ROM COPY |
| int2 | BIT \$D800 | /in VDC busy? | ROM COPY |
| | BPL next | /yes, then wait | AT \$D804 |
| | LDA \$D801 | | |

Location 8D600 also has some other uses when read: bit 7 returns the state of the VDC, in other words whether it is busy or not, as some operations take some time. Bit 6 is used for the light pens, which doesn't concern us. Bit 5 is the vertical flyback bit, so you can synchronize events to the monitor or alter the screen without flickering occurring.

The 16K RAM of VDC

As mentioned before the VDC 'owns' its very own RAM, but it can only be indirectly accessed via the registers. This means you can redefine the character set which is held in the VDC RAM, or move directly to screen. However, this cannot be done in BASIC, so we must resort to machine code. The registers we need are 18, 19, 20, and 21. They must be written to in this order:

- 1 Store the high byte of the address in register 18.
- 2 Store the low byte of the address in register 19.
- 3 Store the byte to point at address in register 20.
- 4 Store the number of characters in register 21.

However, the VDC stores the number of characters plus one. So in register 21 we have to store the number of characters minus one. Also, you may have noticed that you can't print new characters. Obviously you can, all you need to do is not write the number of characters to register 20. The whole process is carried out with bit seven of register 24 cleared.

You can also copy RAM from place to place, using the same method but thankfully it works properly! The number of characters to be copied corresponds to the word count register (21). The method is basically the same as storing characters but you must set the copy bit in bit 7, register 24. The start address to be copied is stored in registers 18 and 19, and the destination address is stored in registers 20 and 21. The copying process begins when the word count register is written to.

The VDC Screen

The screen is extremely versatile - you can change the physical size of the

Figure 4

Reading and writing RAM. Writing one character:

| | | |
|-------|-----------|-----------------------------|
| read | PHA | /temporary store |
| | TAX | /store |
| | LDX #19 | /low |
| | JSR write | /style, |
| | DEX | /store |
| | TYA | /high |
| | JSR write | /style |
| | LDX #21 | /recall |
| | PLA | /and store |
| | JSR write | /style |
| | LDA #18 | /store dummy |
| | JSR write | /and leave (if stand alone) |
| write | STX 8D600 | /done 'JSR write' |
| read | BIT 8D600 | |
| | BPL next1 | |
| | STA 8D601 | |
| | RTS | |

Writing more than one character: Accumulator holds the character to be stored, location 250 holds number of characters minus 1, X and Y hold the low and high address of the location in VDC memory.

| | | |
|-------|-----------|------------------|
| read | PHA | |
| | TAX | |
| | LDX #19 | /write low byte |
| | JSR write | |
| | DEX | |
| | TYA | |
| | JSR write | /write high byte |
| | LDX #21 | /write character |
| | PLA | /to be stored |
| | JSR write | |
| | LDA 250 | /write number of |
| | DEX | /characters-1 |
| write | STX 8D600 | |
| read | BIT 8D600 | |
| | BPL next1 | |
| | STA 8D601 | |
| | RTS | |

Reading a byte from RAM:

| | | |
|-------|-----------|-----------------------|
| read | TXA | /store |
| | LDX #19 | /low |
| | JSR read | /style |
| | DEX | /store |
| | TYA | /high |
| | JSR read | /style |
| | LDX #21 | /recall |
| | JSR read | /and store |
| | RTS | /return, Acc. = value |
| write | STX 8D600 | |
| read | BIT 8D600 | |
| | BPL next1 | |
| | STA 8D601 | |
| | RTS | |
| read | STA 8D600 | |
| read | BIT 8D600 | |
| | BPL next2 | |
| | LDA 8D601 | |
| | RTS | |

Questionnaire 1

Whether you wish to test your neighbours IQ or find out how clever friends at your computer club are, this program will help you.

By David Warner

Questionnaire 1 enables you to compile your own multipurpose quizzes and save them out to disk for use at a later date. You can use the program just for fun or even use it for educational purposes.

The program is presented here as two basic programs. Type them both in separately and save them out to disk. When you want to use the program simply LOAD and RUN the program "Q-BEST". The second part of the program will then load and execute automatically.

What's the question?

Obviously before you use the program for the first time you will need to set up some questions.

When you select the "Create questions" option from the main menu you will be asked for the number of questions that you want to set. You will then be asked for each question in turn together with a number of possible answers. Once all of the information for each question is answered, you will be asked to indicate which is the correct answer.

If you find that your question is over one line in length, you must start the next line after spaces from the start of the second line. This is to ensure that the text will be correctly formatted when displayed on the screen.

See listing on page 72.

Save your work

When saving your questions out to disk, you may find it useful to include the number of questions within the filename. The reason for this is that you will need to tell the computer how many questions are to be loaded when you want to read any quizzes that you have set. As an example "HISTORY 20" would be a set of 20 history questions.

Time out

Precision is made within the program

to display a clock on the screen. To use this feature you should enter the time in the format P.12.05.00 the P being PM (A for AM) and the following numbers being the hours, minutes and seconds respectively.

Software for Sale

Should you purchase this month's software for sale disk you will find that there are three sets of sample questions for this program on it.

QUESTION NO. 1 WHAT IS THE SMALLEST BIRD IN BRITAIN?

- A. BLUE TIT
- B. COAL TIT
- C. HOLBRECKT
- D. GREEN

ENTER A,B,C,D.? ■

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May I Interrupt?

How to make your C64 reveal its split personality.

By Norman Doyle

Intrerrupts can make your computer do things that it was never designed to do. For example, it is impossible to have capital letters, Commodore graphics and lower case letters on the screen at the same time. The usual font is capitals and graphics with no lower case or capitals, lower case and limited graphics.

To have everything on the screen at the same time, we have to change the screen style in mid-scan. This is known as a raster interrupt because it takes place during the time that the screen, or raster, is being scanned.

First of all, we have to tell the computer where we want the interrupt to occur on the screen. The scan time is divided into 256 parts but although a full scan takes 256 raster counts units, the screen is only visible when the value lies between 31 and 251. By storing a value in \$0201(2), you can cause an interrupt to occur at any moment during this scan period. If this occurs while the visible portion of the screen is being scanned, it is called a split-screen interrupt.

First of all, we have to set up the interrupt conditions. Listing 1 may seem familiar because it's based on the routine that I showed you last month. The new part of the initiative routine sets the raster interrupt.

The accumulator is loaded with the value which represents the point at which I want to interrupt the screen. It is stored in location \$10012 - the raster compare byte. Next, the computer has to be told to expect a raster interrupt. This is done by setting the first bit in location \$0001A.

You'll notice that there are two interrupt routines and that one modifies the interrupt vector (absolute byte \$0014) to point to the other routine. So you establish two interrupt environments which are executed on alternate interrupt periods.

The basic routine causes the colours of the screen and border to change in mid-scan and the effect on the screen makes the top of the screen yellow and the bottom area black.

After then changing the interrupt vector, each routine has to reset the

Table 1

| Command Type | Examples | No of cycles |
|--------------|---|--------------|
| Implied | CLC CLD CLI CLT DEY DEY INS INS SELP SEC SEC SEL TAX TAY TSO TSA TUS TVA | 2 |
| | PHA PHP PLA PLP | 3 |
| | RTI RTS | 6 |
| Absolute | JSR | 6 |
| Relative | BCC BCS BEQ BML BNE BPL BVC BVS | 2* |

*Add an extra clock cycle when the program makes the branch and add another if the branch then crosses a page boundary.

value of the interrupt compare byte to that of the other interrupt value. Then the computer is told to execute the next screen interrupt by setting the lowest bit of location \$D8019.

In case you're wondering why two interrupt routines are necessary, consider what would happen with only one. When the first interrupt causes the screen colour changes and will not automatically change back to the original colour. The net effect, therefore, would be to maintain yellow as the screen colour to match what the run time program was trying to dictate. The second interrupt changes the colour so that the colour banding repeats.

The RASTER1 and RASTER2 values are arbitrary ones which I have selected for this demo. The first value must be less than \$1 otherwise a black band would appear at the top of the screen - a good way to create a coloured band across the middle of the

screen. RASTER2 determines where the colour change occurs, therefore any value between \$A3 and \$FF could do.

The second routine starts off with several NOP commands. Although these apparently do nothing, the effect is to delay the execution of the colour change so that it occurs at the end of a line. Without this delay, the interrupt would occur in the middle of the line causing flickers which may show up as flickering or create a 'step' on the smooth line of the screen split.

Such timing problems can be tackled in one of two ways. The MDP system lengthens the interrupt code and reduces the amount of time in which other things could be done. A better way of counteracting this problem is to place the colour change code further down the routine, after calculating the number of clock cycles which are needed for the delay. A list of these cycle times can be found in Table 1 and Table 2.

Table 2

| Instruction | Absolute Address | Absolute Address | Zero Page | Zero Page X | Zero Page Y | Character X | Character Y |
|-------------|------------------|------------------|-----------|-------------|-------------|-------------|-------------|
| ADC | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| AND | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| ASL | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| BIT | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| CMP | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| CPX | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| CPY | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| DEC | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| IOR | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| INC | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| JMP | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| LDA | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| LDX | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| LDT | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| LSR | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| DRA | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| ROL | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| ROR | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| SBC | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| STA | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| STX | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| STY | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

*Half-line clock cycle if indexing crosses a page boundary.

The timing is not too crucial because setting up a new page line takes approximately 28 cycles. From our example, we can calculate that

now NOP actions represent 18 cycles. This means we have to add between 18 and 26 cycles. If the following lines are moved to replace the NOPs, the

program should run as if nothing has changed.

LDA #ROUTINE1A/\$255 ... 2 cycles
 STA LD_VICTOR ... 4 cycles
 LDA #ROUTINE1B/\$258 ... 2 cycles
 STA HI_VICTOR ... 4 cycles
 LDA #RASTER1 ... 2 cycles
 STA SD01T ... 4 cycles
 Total=18 cycles

To get both sets of characters on the screen at the same time means indulging in a little simulation. This may seem like cheating but a little study of the ROM handling will reveal the reasons why the technical white lie is necessary.

The VIC chip can only access one 16K block of memory at a time. This not only applies to the screen but also to the character set. On power up the screen is situated at \$0400 but the character ROM lies at \$2000, well over 16K away. To allow the VIC to 'see' the ROM, the operating system places an 'image' of the ROM at \$1000. This image is invisible to the user but essentially very real and necessary to the operating system of the computer.

All we do with the supplementary Listing 2 is to physically transfer the ROM characters to the lower system of memory where its image normally lies.

Having done this, the two routines have to be altered to switch between the 'original' characters and the lower case ones. This is done by altering location \$D8018 which acts as a character pointer. How this works does not concern us yet. It will be the subject of a later section of this series.

Next, enter Listing 3 and then run it. You will see two capital blocks but press any key and the bottom set changes to lower case. Now we have both character sets displayed at the same time.

Move the cursor to the bottom line of the screen and continue pressing down the cursor until the first line of the bottom block lies on the screen split. Now you can see that my 'arbitrary' split value was not so arbitrary after all!

What you should see is that the top half of the letters are in capitals while the bottom half remain in lower case.

That's as far as I am going during this session but next time I'll be concentrating myself with smooth scrolling and the tricks that all this opens up to the programmer. TJ

See Listings on page 72.

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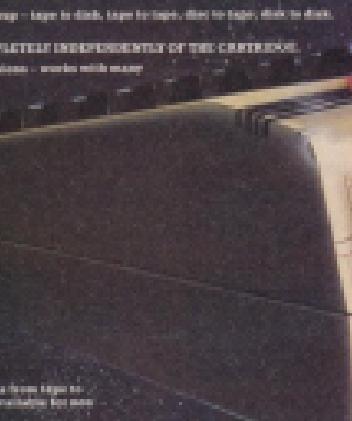
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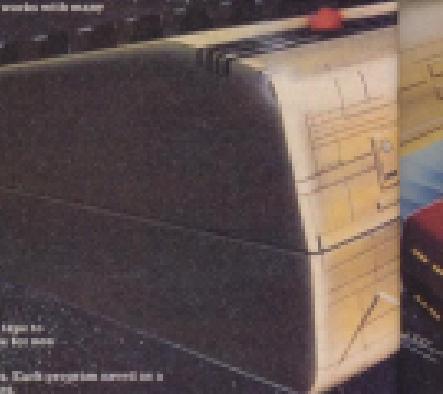
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- **POKE/CLEAR MODE.** Press the button and make those poking for video games easy, then restart the program or make a bootup. Read the manual.
- **MULTITASK TRANSFER.** Does transfer multilayer programs from tape to tape. The extra parts load fast - a unique feature. Unprecedented disk compatibility for non standard multi-loaders (see below).
- **SUPER COMPACTOR.** Ultra efficient program compression technology. Each program saved on a single tape. I program over 400Kbytes = 1 program per disk, if you use both sides.
- **TEXT EDITOR.** Change file names, high score screens etc. Put your own name into a game then convert it or make a bootup to read on disk. Very simple to use.
- **MONITOR.** Full feature monitor type DISK TURBO copy monitor. All standard features plus many more; unassemble, disassemble, save dump, compare, merge, MSX, Intel, assembly conversion, basic to working language, basic macro etc. More to come. Full processor support.
- **DISK MONITOR.** A special monitor for use on the IBM compatible disk drives. All the usual commands - a useful tool.
- **WHOLE DISK COPY.** Copy a full unpartitioned disk to under two minutes with only one drive.
- **FAT32 FILE COPY.** Works with windows and Warp 25 files of up to 16M bytes. Converts formats in and from Warp 25.
- **FAT32 FORMAT.** Under 10 seconds.
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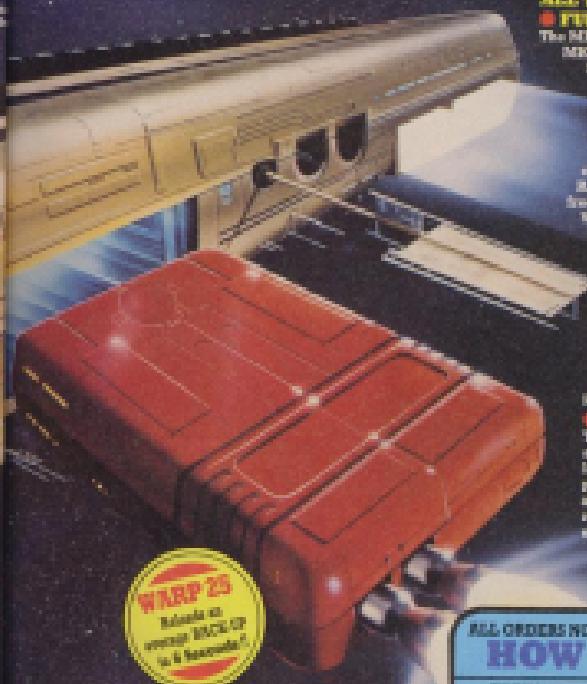
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BobsTerm Pro

A close look at what could be the ultimate C64 communications program.

By David Janda

BobsTerm Pro (BTP) was produced in the United States by Bob Lenzier, a leading authority on Commodore communications. The package is being distributed in the UK by Precision Software who are best known for their Superbase and Superscript packages.

To refer to BTP as communications would be a bit of an insult. BTP is a complete telecommunications environment that incorporates almost every facility you could hope for. I say 'almost' because the package was written for the American market, and although there are a few facilities that we would not use here in the UK - the Foster file transfer protocol being one example. Having said that, the few incompatibilities that I noticed do not affect the overall performance of the package.

User Friendly

BTP is a complex package, yet easy to

use. This is because the author has opted to make BTP completely menu driven. Not the best user interface when compared to something like Amiga's Kickstart, but it's very fast and effective in use. All the menus are well laid out and it was immediately apparent that a lot of thought went into the design of the menus. Presenting a screen full of detailed information such as the XMODEM transfer characteristics in a clear, easy to read format is not an easy task, but BTP succeeds in this respect.

The menus are in a hierarchical form with the main menu in the 'top' with sub-menus leading from it. Most of the commands are of the single key type with the letter corresponding to the action, e.g. pressing the Commodore key with L will toggle the echo. There are 19 such commands which are called context commands, and pressing 'K' from the main menu will list them with their associated functions.

Features

There are three methods of entering terminal mode in BTP. By pressing 'T' from the main menu, from the auto menu after dialling a number, or from the auto menu in answer mode. Once in terminal mode you are presented with a blank screen with five status lines at the top; the first of which is used to display various comkey settings, e.g.:

CR-BEFSNN-E-LHDCP-ASC-n
00000000000000000000000000000000

BTP will show how many characters free there is in the buffer (which starts off at 20,480 bytes), E indicates whether echo is enabled and so on. Options that are enabled have their corresponding letters displayed in reverse video, and all the context commands are accessed by pressing the Commodore key followed by a letter (Table 1).

The next line consists of 40 dashes or a double row of dashes depending on whether the modem is on or off hook, and the following two lines are used to display various messages when transferring files. If anything drastic happens, such as an aborted file transfer, a *Badfile* message will be displayed on the next line.

Communications is carried out on the following twenty lines by forty characters with the option of entering text in a two line window. This is very handy for those who like to play on-line adventure games or use real time chat facilities because the entered text will not be broken up by incoming text.

One *coolkey* command of particular interest is the word wrap feature. When enabled, text entered by the user will be formatted. Likewise, text being sent from the host system will also be formatted and this feature proved to be most useful when using BBSs that are set up for 80 column output.

The terminal mode and the rest of BTP has a couple of cosmetic features. If you don't like the character set that is used then you can select another from a choice of seven, and you have the ability to define your own. The colours used for text, error messages, menus and so forth can all be individually changed as well.

Buffering

Most packages have some sort of buffering facility which can be used to grab text that is being sent from the host system. With BTP the concept of buffering is taken much further. You have the option to *SAMMLOAD* software from disk or RAM, after the buffer with a complete array of editing commands that would put some word processing packages to shame, and much more. BTP does not limit the buffer to ASCII nor only. Basic programs can be automatically converted to ASCII when loaded into memory and sequential listings can be converted into Basic programs. A host of other conversion formats are available, and BTP enables you to define your own!

A detailed spiral bound user guide that's over 100 pages in length describes very clearly every aspect of the package. A section is devoted to each feature and the six page contents ensures easy reference. The guide is

TABLE I — COMMEX COMMANDS

| | |
|---|----------------------------------|
| A | ASCII/BINARY |
| B | BUFFER |
| C | CAPS LOCK |
| D | DISPLAY TRANSFERS |
| E | ECHO |
| F | SCREEN FORMATTING |
| H | HOOK TOGGLE |
| I | LINE FEED IN |
| O | LINEMODE-OUT |
| R | FUNCTION KEY LIST AND EDIT |
| L | LINEMATCH ENTRY MODE (TERM MODE) |
| N | NULL STRIP (TERM MODE) |
| P | PRINTER ONLINE (TERM MODE) |
| R | RESET TIMER |
| S | SET TIME/START/STOP TIMER |
| T | TIME/TIMER TOGGLE |
| X | XPER FILES (TERM MODE) |
| # | DISPLAY CTRL CHARS |
| * | CLEAR SCREEN (TERM MODE) |

roughly divided into three sections; the first part covers getting started (for the impatient), next follows a detailed description of the package and the remainder of the guide covers parameter setting.

Compatibility

Before I detail BTP's features it's worth noting what the package cannot do, and the features that probably will not be of use in UK areas.

First, BTP only works with modems that are connected to the user port, or modems that are interfaced with an RS232 converter which in turn is connected to the user port. This rules out the UK Commodore modems (commonly referred to as the Computer modems). BTP contains a number of 'drivers' and is configured to work with the following modems:

Commodore 1650 Acclaimmodem;
Commodore 1660 Modem*200;
Commodore 1670 Modem*1,000;
Monitor Modem;
Master Modem;
Marty-Mo Modem;

HST II and II Modems;
Total Telecom Modem;
Hayes Smartmodem.

Most of the modems listed are not available here in the UK. This is not a problem though as BTP will work with any manual modem that's connected to an RS232 interface. However, unless you have one of the intelligent modems listed, or a Hayes-compatible modem such as the Pace Series Four you will not be able to make use of the automated features of the package. Deltor/Voyager owners will not be able to interface with BTP as these modems auto-dial by toggling the RTS line which is rather unidirectional. Having said this it should be possible to make use of the auto-answer feature of these modems as long as you right on the RS232 connector is connected.

BTP allows pulse or tone dialling. The tone dialling feature is created by feeding the audio output of the C64 pack into the modem, but this feature is redundant because the UK System X dial tones are different from those used in the States - enough said.

Two other points worth noting are the Pointer file transfer protocol and repeat dialling. BTP provides a number of file transfer protocols from straight ASCII to ZMODEM (which is widely used throughout the UK). The Pointer protocol is quite common in the US but not so here. However, I understand that a number of European Commodore Bulletin Boards will soon be using Pointer, and if you should dial direct to the States it will no doubt be of aid!

On a more serious note, BTP allows for repeat dialling. That is, when a number is auto-dialed and the host at the other end of the line does not answer BTP will continuously try the number over and over again. Your Commodore would like to point out that it is currently illegal for modems to repeat dial more than four times in succession, and as there is no facility to limit the number of cycles to four points this feature should be used with caution.

The Clever Stuff

The note made in BTP is used with one of the intelligent modems that is supported by BTP or a Hayes

compatible modems. From the auto menu menu you can enter a phone number and BTP will send the necessary command string to the modem to get it to dial the number. In answer mode the package will wait for an incoming call, answer the phone and display a welcome message which can be defined by the user. A neat feature is the ability to set up a password, thus offering a degree of security.

It should there are many similar sets of commands than you are when logging into a BBS or database, BTP allows the user to define a series of operations, called macros, that can be executed manually or automatically. Basically, a macro can consist of any BTP command, be it menu level, a context command or text that you would enter in terminal mode. The macro facility also has a degree of program control, so it's possible to detect whether certain characters have been sent by the host, and if so perform another set of commands.

The macro commands can be executed manually or automatically by setting a time when they should be executed. I had great fun defining a macro to dial Telecom Gold, enter my ID and password, check if there was any mail, spell it to dict, if so end log-off, or log off if there was none - all done when I was down the pub!

It's not as easy as it sounds though, and I wish BTP had more sophisticated macro commands. As it is, the present commands are rather limited.

As I have mentioned before, BTP is a sophisticated telecommunications package, yet it's easy to use. Even though the package is loaded with features, using it is simplicity itself, and if you use the phone book option which adds a set number each time it is executed things are even easier. For example, from the main menu, connecting to a BBS or database can be as little as three key presses away; this ease of use is by far BTP's strongest point. The menu system is excellent

and enabled me to use the package straight away with no problems whatsoever which is ideal in a commercial environment, but comes package can offer a set of pre-defined settings that will see you through all possibilities. BTP offers some, but it also allows the use to tailor just about every aspect to their own requirements and save them in default settings.

In simple terms, Bob-Tech Pro is the best piece of terminal software I have used on the Commodore 64. Its powerful facilities match and supersede those found on many professional PC based telecoms packages, and at £24.95 it represents excellent value for money.

Supplier:

Name: Bob-Tech Pro. Supplier: Precision Software Limited, 6 Park Terrace, Wimborne Park, Surrey KT4 7JY. Tel: 078-733 7196. Mktg Dir: C64/128. Priced £24.95.

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Sprite Library

Continuing our Sprite Library series, this month we look at the ways of producing different types of vehicles.

By Mike Bean

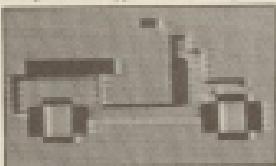
This month's addition to the Sprite Library will be helpful in the area of scrolling backgrounds. The vehicles listed in the table require multi-colour mode and each definition needs two sprites per vehicle. Each vehicle is made up of four blocks of sprite data - the first pair being a side view and the second pair depicting a birds eye view. All the traffic faces right so if you need any of the vehicles facing left they will need to be manipulated by a suitable sprite editor.

Table (Vehicles - Multi-colour)

| Hex | Decimal | Description |
|-------|---------|-----------------|
| A8-A3 | 168-163 | Bicycle |
| A4-A7 | 164-167 | Transistor |
| BB-BB | 168-171 | Scooter |
| AC-AT | 172-173 | Motorcycle |
| B0-B3 | 176-179 | 35 CWT Van |
| B4-B7 | 180-183 | Light van |
| B8-BB | 184-187 | Land Rover |
| BC-BF | 188-191 | Light pickup |
| C0-C3 | 192-195 | Jip |
| C4-C7 | 196-199 | Station car |
| C8-CB | 200-203 | Small hatchback |
| CC-CF | 204-207 | Saloon car |
| D0-D3 | 208-211 | Sports car |
| D4-D7 | 212-215 | Porsche |
| D8-DB | 216-219 | Racing car |
| DC-DF | 220-223 | Taxi cab |

Getting it all in

Type in the Basic loader as published and save it as `168.BAS`; run it or it will self-destruct. Before running the loader program you will need to reset the computer and type the following:



`POKE1640H POKE1644H POKE1634H, 0:NEW` and press return. This will trick the computer into believing that the Basic now starts at \$4000 instead of \$8001. Load in the Basic loader and run it; if error free, the program will automatically save itself as a block of data. If you reload that data in the future remember to add a 1 after the device number. The data is saved under the following location: `$2800H-$307FF`.

The sprites are from 160 to 223 in a consecutive sequence so avoid the area of \$3000 traditionally set aside for redressed character graphics and to avoid the need of typing a line after line of data.

If only one or two sprites are required then use this formula: $\#$ Sprite block No. \times 160 + 190 = the data line number at which that sprite blocks data starts. Remember to type in the following three lines of data and after the variable `BL`, is the number of data lines you have in your finished program, less 1.

The small basic program `Vehicles Display` will print the sprites variously in expanded form on the screen in both side and top views simultaneously. To hold on any sprite enter the same number for Start and End.

An Sprite Editor program will enable you to change and adapt the individual sprites to your own requirements.

See Savings on page 37.

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Bothersome Basic

The old truism garbage in, garbage out is still relevant today, especially when using the INPUT command.

By Norman Doyle

One of the most common reasons why a program crashes is through unexpected responses when the user has to input some data through the keyboard. Trapping these unpredictable entries not only calls for an alert programming mind but also for a rethinking of the whole situation.

The problem with the Basic INPUT command is that it runs according to its own rules. This is fine if the user understands what these conditions are but not very forgiving if they don't. If the input is stored as a string variable the problems are easily resolved but using a numerical variable causes real problems.

Using inputs which take up less than two screen lines will rarely cause problems as long as the string doesn't include a comma or a colon. Either of these symbols act as a terminator and only that part of the entry before the first occurrence of one of these symbols will be accepted as input; the rest is ignored. The computer responds to an incomplete acceptance of the attempted input with a rather unfriendly EXTRA IGNORED message.

A simple program such as:

```
10 INPUT"ENTER MESSAGE":A$  
20 ?A$
```

would respond to an input such as

```
MASTER OLIVER TWIST,WANT  
MORE.  
in the following way:  
TEXTRA IGNORED
```

If the user made a mistake and went back with the delete key so as to totally erase the ENTER MESSAGE prompt, further chaos would result with the following response:

```
TEXTRA IGNORED  
R TWIST
```

The part typed over shows the original prompt was up to the cursor's original starting position but had ignored as well as the extra piece after the comma.

The number of characters typed in an input can also cause problems. If the input continues beyond two screen lines and ends a field, only the characters on the third line will be accepted and no error message will appear.

The only way around this is to get confirmation of each entry with a check routine such as:

```
10 INPUT"ENTER MESSAGE":A$  
20 ?"PLEASE CONFIRM THAT  
YOUR MESSAGE WAS":C$  
30 ?A$?
```

```
30 ?"PRESS Y OR N"  
40 GET B$ IF B$="Y" GOTO 10  
40 GET B$="N" GOTO 10  
50 GOTO 60  
60 REM REST OF PROGRAM
```

Of course this only confirms or denies that the entry was correct. A total novice might keep trying to type in the same message until boredom and frustration sets in. The only helpful way out is to give specific details of what can and can't be done when an error is confirmed. Quite a painful and dull way to write an interactive program.

As if this wasn't bad enough numerical variables can be used. At least the incorrect string inputs don't result in the termination of the program. With an interactive math program it's always tempting to enter very large numbers. Try entering a value smaller into the program:

```
10 INPUT"ENTER A NUMBER":A
```

As the number increases it is eventually treated as an exponential value such as 1.2345E38. If this exceeds the maximum number that the computer can deal with (1.70140864e38), an OVERFLOW IN LINE 10 error will be generated and the program will crash out and return to

BASIC TUTORIAL

the READY prompt and direct keyboard control. Not very impressive in a complex accounts program.

This can only be avoided if the number is entered as a string such as "A5" and then evaluated and stored as a numerical variable, A, after complex processing. There must be a better way!

The best way, though long-winded, is to use the GET command and build a string character. In this way you decide which characters may be entered.

First of all a suitable prompt message and a GOTO loop must be set up:

```
10 INPUT "ENTER MESSAGE: ";  
20 GET ASH$ IF ASH$="" THEN 30
```

Now we need to print the characters on the screen so each is typed in and stored them as a separate string, BS:

```
30 BS=0  
40 FORBS=BS+1 TO ASH$  
50 GOTO 20
```

The difficult part is deciding which characters will be accepted and which will be rejected. First off I assume that the message is going to be a mixture of numbers and letters (alphanumeric characters).

Every letter and number has a value assigned to it under a system known as ASCII (the American Standard Code for Information Interchange). C64 BASIC has a conversion of this which is officially called Commodore ASCII (pronounced askey) but has commonly become known as PETASCII after Commodore's old range of computers which first used this system.

Under this system the numbers zero to nine have values from 48 to 57 and "A" to "Z" have values ranging from 65 to 90. The numbers 58 to 64 cover such things as the question mark, colonization and colon, so to make things simple, we may as well include those in acceptable range. Thus we get a range of 48 to 90.

This range does not include some other useful punctuation marks such as the comma, full stop or exclamation mark, nor does it include the value of 32, which represents a space. Fortunately, these can all be incorporated by stretching the lower limit down to 32.

At this point we can use the greater than and less than facilities as follows:

```
60 IF ASH$<CHR$(32) AND ASH$>"Z"  
THEN 20
```

This means that each character is checked to see if its ASCII value lies between 32 and 90, if not it is rejected and the program loops back to get another keypress.

With the program as it stands BS can be stretched to hold 255 characters and no more. We need a delimiter which will stop any user from trying to type in more than that number:

```
90 IF LEN(ASH$)=255 THEN  
100 MESSAGE "TOO LONG,  
PLEASE TRY AGAIN":GOTO 5
```

There are kinder ways to do this but that will be covered in a later article.

The routine so far will work as long as the user types in the message correctly. What if a mistake is made?

First we must check for a DEL keypress. To jump to the routine for deleting the last letter from BS and from the screen. Even the DEL key has a value assigned to it and this is 26.

If you enter "C64\$DEL\$90", a "Z" will be printed on the screen. Similarly CHR\$(26) will cause a deletion of a character. So we can easily complete one of the demands of correcting a mistake by using the CHR\$(26) command:

```
50 IF ASH$<>CHR$(26) THEN 30  
55 CHR$(26)
```

Obviously this deals with the screen but what about BS? It has to be dealt with using the string manipulation commands. What we need is to keep the left-hand side of BS and disregard the last letter. Putting it another way we reduce the length, LEN(BS), by one. LEN(BS)-LEN(BS)-1 is an illegal command but

```
60 BS=LEFT$(BS,LEN(BS)-1)  
65 GOTO 20
```

will do the trick until LEN(BS)=0. A string cannot have a negative length and an error message would be generated if nothing were done. To trap this problem the following has not yet been a file:

```
40 IF LEN(BS)<0 THEN 20
```

The final stage of the line input routine is to check for a carriage return, ASCII 13, and exit to the rest of the program:

```
70 IF ASH$=CHR$(13) GOTO 110  
75 BS=LEFT$(BS)
```

Although this is better than the normal INPUT command, it's not perfectly foolproof and it does take up a lot more space than the normal input procedures. This can be compensated for by parameter swapping. As you can see from the slightly modified Listing 1, the routine is set up as a subroutine. If the main program avoids using the parameters mentioned (ASH\$) you can USEUB in this routine. On RETURNING BS can be simply renamed with a command such as NEWNAME\$-BS and the routine can then be called again for the next input later on.

For numbers the acceptable range needs only to be ASCII 48 to 57 with special allowances if decimal points, currency symbols or arithmetical operators are expected.

Evaluation of BS could be a conversion to a numerical variable after first shortening the string to a manageable length for the computer to deal with. This is rather like deciding how many significant figures, and hence the degree of accuracy, of a calculation. In this way numbers in excess of 1.7976931E+38 can be rejected before the program tries to use them and subsequently crashes out.

The Deep End

For the more accomplished, the INPUT command can be forced to accept colours and constants by initial memory. Before using the INPUT command, quotation marks are placed in the keyboard buffer as though they had been typed there.

To do this ASCII 34 is pushed into the first buffer byte at #FF and the buffer space at #FF is informed that there's one character already waiting there. When the INPUT command is executed, the quotation mark is printed alongside the input question mark.

```
10 POKE 654,34  
11 INPUT "ENTER MESSAGE":AS  
12 END
```

I suggest that I cannot answer your problems by phone but if you have any queries about basic routines or about these articles, please send them to: Authorship Box, Your Computer, 1 Golden Square, LONDON W1P 1AR enclosing an s.a.e. and my relevant publications or recordings.

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Ackroyd's Saga

Let your computer take the strain of learning tables.

By Allen & Margaret Webb

In case any regular readers of my Teacher's Pet column haven't worked it out for themselves, I've got a pretty shocking confession to make. I am very old fashioned, both in the way I bring up my children and in their education. I believe in old fashioned values of politeness, honesty and respect for one's elders and those old hat school subjects of spelling and learning tables. Both of these have been out of favour for the former because it was believed that it stifled creativity, the latter in some cases simply because the diversity of the curriculum pushed these subjects to the bottom of the pile. Luckily the primary school that both of my children attended believed that learning tables was important and table tests were a regular occurrence.

A look around the shops will confirm the need for mental arithmetic and multiplication tables. How many

times have you watched as simple calculations have been worked out on scraps of paper or the ubiquitous calculator when they could have been computed just as quickly in the brain?

Improving Numeric Skills

Ackroyd's Saga is the first of two games aimed at helping the learning process of mental arithmetic skills. In the game, the 8 to 12 times tables are tested. The nought times table is included since it is a difficult concept to grasp. In the game, you play the role of a trained knight searching for the parts of the key which will let you into Ackroyd's castle. (Ackroyd is the usual evil king.) On your way to the castle you will encounter various enemies. You must fight those if you

want to get passed them, and 'fighting' involves answering tables questions. You answer an odd number of questions. If you get more correct than wrong, you win.

There are five levels in the game with each level posing questions on different tables. The easiest level deals with 0 to 2 times tables, the most difficult deals with 8 to 12. In addition, the levels give you different times to respond. The default values give ten seconds at the easiest level and six seconds at the top level. You can change the times and number of sums if you wish by choosing the help option in the game loader.

The game is controlled by a joystick (or game pad) or keyboard (N moves south, E east, W North, S West). To answer questions you simply type in the answer and press Return. Delete will clear any mistakes.

Games Reviews

*For the latest on the shoot 'em up front,
consult our review pages.*

Quader



Inspired by Gradius's Bounder, Quader is an arcade game in which you must look before you leap if you're going to get to the top of the high score table.

Quader consists of ten tracks of planes that can be attempted in any order but only the very bravest stupid dive straight into plane one.

In plane one you simply have to complete a series of exercises that will prepare you for what's to come. In the other planes you must reach the GOAL before the time runs out. To get to the goal you will have to negotiate a maze, travel long distances and through teleporters, avoid ground that drains your time and areas that just disappear leaving you in the way to oblivion. You will have to get around locked doors that are opened only by finding specific keys. To add to your problems some keys remain invisible until you've set to them, and are usually used to kill Skell and Green hoses, where one wrong move will cost you that game.

However, you can get some help from objects you can pick up such as arrows that reveal the GOAL and objects that give you extra speed or more time and sound surprise buttons that may help or hinder you.

At the end of each plane you have a chance to pick up some extra points in a bonus screen and a chance to test before attempting the next plane. This game would be tough enough without the time limit, with it, it's almost impossible.

T.H.

Psychedelic

Peter Quader, Supplies Division, 2 Minerva House, Calver Park, Aldershot, Hampshire GU17 2QH. Machine C64. Price £5.99 (C) 1987 QD. Originality: 2/10. Graphics: 5/10. Playability: 4/10. Value: 5/10.

Starfox



It is the unofficial sequel to *Starfox*, you are Hawks and your mission is to destroy the alien that have invaded the protective Rubicon cube that surrounds eight planets.

The standard Starfox is equipped with a turbolaser that will send you hurtling through space but will also drain fuel at an alarming rate and a standard laser. However, you can improve your chances and your health by docking with母星ships that orbit the eight planets and choosing from the selection of weapons that include energy bolts, shockers and more powerful lasers.

You'll need this extra weaponry to swipe out the invading swarms of aliens that come at you ten at a time. If you haven't got the right weapons you may have to shoot each alien four times to destroy it.

The aliens don't actually live at you but they do exhaust your fuel supply which will cost you the game. You can refuel at a planet or from a refueling ship but only if you can find one in time.

Starfox is a game that will require its players to invest some time in it before they become hooked. Once they've completed a few levels (this will take some time) they will become hooked by it.

Touchline

Title: *Starfox*. Supplier: Aviator. 9 Discs. Pd. Price: £24.99 (US) £29.99 (Aus). Originality: 3/10. Playability: 5/10. Graphics: 5/10. Value: 6/10.

Indiana Jones and the Temple of Doom

Indiana Jones is set to have some small screen in the C64 conversion of the Alan Parson's version of the film.

Armed with just his trusty whip Indy must fight off trigger guards and snakes as he attempts a three stage game. In part one he must rescue children trapped in cages by whipping the locks off. These cages are spread throughout a cave network linked by ladders and ledges as



well as peers that our hero can attack his whip to and swing across Tassman style. If he manages to free all the children he can escape in a mine cart and into part two.

This is the shortest part of the game and is simply a ride in a mine cart down a broken track. When you come to a break in the track hitting over will avoid disaster, but may bring you into range of the Trigger guards or into the path of the passing cart. This is an all too common stage so taking a wrong turn will cost you a life but once you've beaten the track it couldn't be easier.

At the end of the track you enter the Temple of Doom and can attempt to retrieve one of the Sarpan stones. Once again you're attacked by trigger guards and slithering snakes but if you get your timing right you can swing over the fire garage, grab a stone and escape only to find yourself back in the cavern with more children to rescue.

As a conversion the game is reasonably close to the original (although the music is terrible). Unfortunately, the original game rapidly became repetitive, and desperately needed three or four more levels. A good conversion but there have been better games to convert. TPL

Touchline

Title: *Indiana Jones and the Temple of Doom*. Supplier: US Gold. 27 Middleway Way, Birmingham, B14 3AS. Tel: 031-331 3388. Machine: C64. Price: £9.99 (UK) £12.99 (Aus). Originality: 3/10. Playability: 6/10. Graphics: 3/10. Value: 6/10.

Captain America

What America is threatened with total annihilation who do you call, Supermax Commandos? Not this time it's Captain America - the defender of the Constitution who must save the day!

Dr Strigemore, a man who the CIA claimed they killed in Cuba in the early sixties has emerged from hiding and claimed the Presidency of the US of A., and if power isn't handed over he'll fire a nuclear missile packed full of killer virus at North America and wipe everyone out.

One hundred cities have been stormed by the mad doctors base but now all killed by the deadly virus. Now you, Captain America must save the world!

The doctor is holed up in the rats of Doom and it's not going to be easy to get him out. The rats of Doom consists of three consecutive levels packed with laser firing robots. Your mission is to fight your way through all three levels to destroy the rocket, and bring Dr. Megalomanic to justice. As the game begins you are sitting at the controls of the Oblivion, an elevator that runs between the outer and middle cylinders. From this you can gain access to the floors of the Tower of Doom.



The deeper you get into the tower the greater the level of virus that will slowly overcome you. Captain America's superhuman strength and so you must stay within your maximum range. You must also find a way to increase your immunity so you can explore these deeper levels.

Perhaps the answer lies in the rooms that you can reach by bursting the robots in each level. Here you'll find more laser firing and homing enemies as well as a source for your Captain America shield (your only weapon) and maybe even a few coins.

Captain America is a massive arcade adventure in which your reactions will have to match your brain power if you're going to survive long enough to save the day.

T.H.

Tom Hines

Dates: Captain America. Supplier: C64. 27 Bedford Way, London NW1 3AS. Tel: 0171-356 3088. Machine: C64. Price: £9.99.

Originality: 7/10. Playability: 7/10. Graphics: 6/10. Value: 5/10.

On Court Tennis

On Court Tennis is another of the Activision Gamesstar games to be developed by Firebird as a budget price. This time you can pick up your racket and strike out onto the court against as four, Burns, John or Jimmy to take on in

computer or human opponent in a match lasting three or five sets.

As the players take their places on court the temptation is to write the game off as having poor graphics but gradually the attractiveness of the gameplay takes over. Even when you're 3-0 down you still think you've got a chance!

The game is controlled entirely by the joystick with it's movements deciding the strength and direction of the shot. This, of course, depends on how well you time your shots and whether you play the right shot at the right time. With that let no think about it's looks. That the computer automatically moves you to the ball so you can concentrate on the shot.

The result is a tennis game that was over priced in the full-priced market, but at last as found it's right value for money. It's limited and at times not very pretty, but as a cut-priced tennis game it has the advantage.

T.H.



Pompeii

Date: On Court Tennis. Supplier: Firebird, 27 Bedford Way, London NW1 3AS. Tel: 0171-356 3088. Machine: C64. Price: £1.99.

Originality: 6/10. Playability: 6/10. Graphics: 6/10. Value: 5/10.

Beach Head II

Beach Head II, the game that shocked the world with its realistic scenario is back as part of Mastertronic's Activision range. In this, the sequel to the highly successful Beach Head the evil, sunburning, bloodthirsty, power crazed emperor dictator known as the dragon is out for revenge and plans to destroy the forces that wrecked his fortress in the original game, that means you.

As in Beach Head, Beach Head II is a multi-stage arcade game, only this time you can play either side in a head to head contest.

The first sequence is a two-part game with the dictator making a massive gun that tries to blast the good guys as they're dropped by helicopter behind the first line of defences. Once they've all been dropped you must bring



then forward while running the gauntlet of the plant guns. If they're hit, they let out a bloodcurdling scream or yell for a refund! As you approach the gun you can sidestep and maneuver a wall while the gun will be destroyed but soon replaced so you have to move quickly.

In stage two you must rescue the men captured by the dictator by ramming their own guns against them. This isn't going to be easy as the prisoners escaping across the coast yard can be shot by men on walls, blown up by mines thrown out from trap doors, killed by a truck or slowly and loudly crushed by a tank.

Part three is a Zaxxon style screen in which you must fly the escaped prisoners to safety in three helicopters, along as you can get past the EDragon's defenses and finally in part four, your in man to man combat with the dictator in his underground caves. To win you must had pointed sticks at the villain and escape his deadly throws.

Bush Head II is a loud, action-on-the-spot arcade game that won't win any good taste awards. T.H.

Toonblitz:

Title: *Bush Head II*. Supplier: Amesys, 6-10 Paul Street, London EC2C 2LY. Tel: 01-737 6880. Machine: C64. Price: £2.99. Originality: 4/10. Playability: 7/10. Graphics: 7/10. Value: 7/10.

Nebula:

Nebla is yet another incredibly addictive Hewson arcade game in which you, a lone little frog-like creature, must destroy a series of unauthorized houses that someone has built in the sea. Your job is to climb up to the top of these houses and destroy them.

Unfortunately, this is going to be far from easy. You arrive by minibus at the base of the first of eight towers. Around it you can see a series of platforms and ladders that you must navigate as well as a series that lead from one side of the tower to the other. Each tower is also patrolled by a selection of nasties. Some can be blotted with your bubble gun, while others are indestructible and must be avoided at all costs. This isn't always easy when you're walking along

platforms that disappear from under your feet, slide you backwards as quickly as you can run forward and gaps that are just further than you can jump.

It all adds up to a great game that adds new lease of life to the addictive platform game format. T.H.



Toonblitz:

Title: *Nebula*. Supplier: Hewson Consultants. House Name: 358 Milton Trading Estate, Milton, Abingdon, Oxon. Tel: 0125 826010. Machine: C64. Price: £2.99. Originality: 4/10. Playability: 7/10. Graphics: 7/10. Value: 7/10.

Action Force:

When the evil enemy Cobras attacked the small island of Botanica, the military installations were destroyed. All except the system part which contains some classified information stored on hard disk. This data must not fall into enemy hands. There just isn't time to organise a conventional force attack so they must send in the Action Force.



Lady Jay and Crankcase man the A.W.E. Striker that has been quickly modified for data retrieval and so must be protected by you, Wild Bill, and Flint in the Dragonfly XH-1 helicopter.

The enemy will bombard you with other helicopters, planes, guns and missiles that you must blast and avoid while clearing a path for Striker.

The result is a standard sideways scrolling shoot 'em-up with eight levels that may have some appeal for Action Force fans. Anyone else who wants helicopter action should take *Quicksilver* for a test flight. T.J.R.

Torchline:

Elite Action Force. Supplier: Virgin Games, 2-4 Finsbury Park, Finsbury Rd., London N1 3EL. Tel: 01-327 4878. Machine: C64. Price: £9.95 - disk only. Originality: 4/10. Playability: 6/10. Graphics: 5/10. Value: 6/10.

On the Tiles



Fred and Odin present the first tile-based simulation in which you must patrol the streets in search of fish bones to gain control of eight streets.

Unfortunately, all is not peaceful for our fishy heroes who must avoid the attention of blood sucking fleas and the chomping effects of frogs as well as the final touch of kitty hawks and hedgehogs. Luckily, you can regain lost energy by grabbing a sparrow or mouse as you leap from window sill to rooftop.

You can protect yourself from things that cost one of your nine lives by spitting some green unguent substance at them. However, at times you don't have time to react since you must press the space bar to fire which is never near enough to the joystick to save myself.

On the tiles is a good but tough game which features some nice animation and addictive gameplay. T.M.

Torchline:

Elite: On the Tiles. Supplier: Electrical Wards, 64-76 New

Oxford St., London WC1A 1PS. Tel: 01-730 6753. Machine: C64. Price: £7.99 (£7.29) (Disk). Originality: 4/10. Playability: 6/10. Graphics: 5/10. Value: 6/10.

Super Sprint

Super Sprint is the latest coin-op conversion for the C64 and attempts to recreate the arcade racing game that's been an amazing arcade hit.

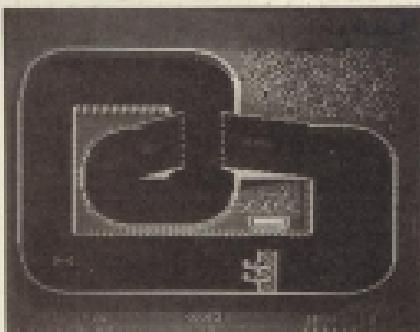
Unfortunately, it's impossible to get three players around a C64 and so this conversion has only a one or two player option with the remaining cars driven by drivers. These drivers never skid or crash but are easily beaten by a skilled player, but will wipe you out if you hurtle around very fast and end up in a smouldering heap. Your car is quickly replaced by one that arrives by helicopter but you still have lost valuable time.

Once you've selected one or two players (and if two either a head-to-head conflict or a normal super sprint) you can select one of the four tracks that feature tight bends, bridges that obscure your view and gates that open and close to allow you to take short cuts that could win you the race.

On the track you may also find oil slicks that will send you spinning, bonus points and occasionally gold spawners. If you collect three of these spawners in a race you can improve your car by adding super traction, turbo acceleration or a higher top speed or just improve your score with a score multiplier.

Whatever you choose over the experienced champions have to avoid the spinning whirlwind that gets you in a spin if you're caught in its path.

Super Sprint is a good conversion that will drive racing fans round the bend as they attempt to build a car that can beat all comers. T.B.



Torchline:

Elite: Super Sprint. Supplier: Electronic Wards, 64-76 New Oxford Street, London WC1A 1PS. Tel: 01-730 6753. Machine: C64. Price: £9.95 (£). Originality: 4/10. Playability: 6/10. Graphics: 6/10. Value: 7/10.

Teacher's Pet

Need some help with your studies? Then take a look at the latest educational packages. Learning can be fun!

By Margaret Webb

Following the dearth of new educational software over the last year or so, it's nice to have enough material to write another Teacher's Pet column. I want to discuss three packages which are all very different in subject matter. While the review copies all came on disk, there are no technical reasons to preclude their appearance on cassette. In fact, *History*, from Software Horizons, comes with a cassette version.

GCSE Mathematics

The first package is written by Evelyn Mills, a name which should be familiar to regular readers of *One Computer*. This package consists of two sections of the main areas of the 'O' level and GCSE syllabuses in mathematics. Extensive use of a graphics system called Video Basic is used, which allows easy use of high resolution graphics, permitting the drawing of circles and lines and the use of fancy shading and patterns which is used to enhance the appearance of the package and illustrate certain aspects.

The software covers six main topics which include:

- Basic Mathematics.
- Algebra.
- Geometry.
- Progressive Mathematics.
- Trigonometry.
- Linear programming and statistics.

A final section provides a selection of questions extracted from past 'O' level exam papers. In keeping with most exam-based educational software, the material provided is

more of a revision aid for use in conjunction with normal texts and tuition. To give you some idea of the content, I will run through two of the sections - geometry and algebra.

The use of high resolution graphics is put to best use in the geometry section. This section covers a number of topics which include circles, sectors, chords and tangents, plane shapes and polygons. The algebra section, on the other hand, requires less emphasis on graphics. The areas covered include law of indices, even multiplication, removal of brackets, factorising quadratic equations and simultaneous equations.

The examination section is, as expected, fully taxing and extends beyond the material given in the package. I think however, this is only to be expected.

All sections give a good mix of handy tips or rules of thumb and illustrative examples. There is, however, no error trapping, allowing retrospective answers to attack the program. Some examples required input from the user - ensuring that he didn't fall asleep! Overall, the content is good and is presented in an interesting manner. Although it may sound cliche, there was one irritating aspect.

All sections use Video Basic to generate fancy load-in screen views; superfluous displays between topics. Some of these took some time to be drawn and became a little boring. My main objection is that these displays occupy valuable program space which could be used to better effect.

Notwithstanding this point, the

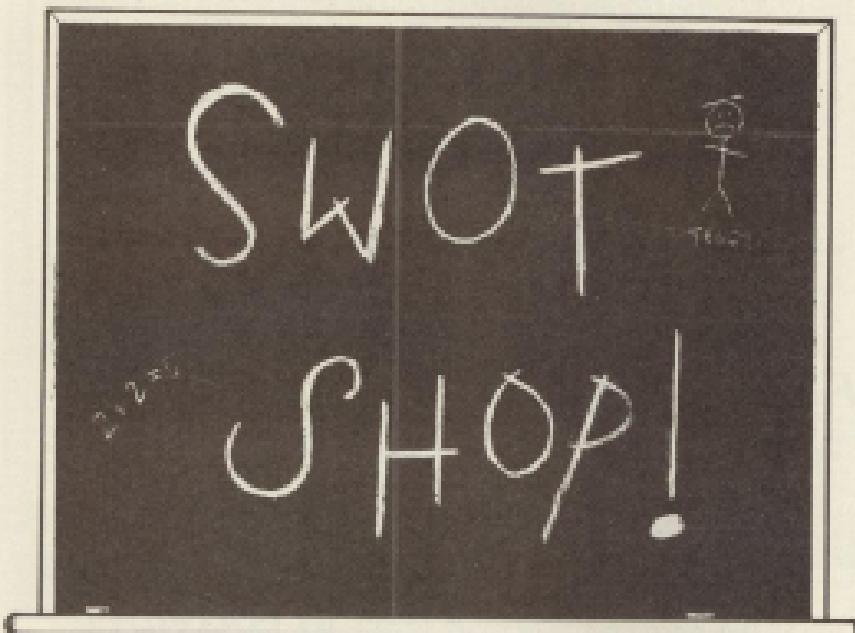
disk is filled well with something like 120K of software on it. One bad point is that the examination section expects you to work from the monitor. This won't present a problem for those using their own copy of the software but is of little value in a busy classroom since it locks up a machine which could be otherwise used. A better idea would have been to provide an option to allow you to make a hard copy of the examination questions and so that the computer could be released for other uses. It would be necessary to return to the machine for the answers.

History Package

The next offering comes courtesy of Duncan Brown School, Ashford. This software uses the Quill adventure writer to create a novel approach to the teaching of History. History is usually a way to mind pupils to sleep, as it is always full of dates, places and names and has as much life in it as a building brick.

The fact is that History is a living subject which involves people of all walks of life. By involving the pupil in the subject, it becomes live and interesting, and software uses the adventure concept to achieve this goal.

The disk contains two packages covering different aspects of the same problem. The main portion relates to an investigation of the past. The pupil has to "travel" around seeking information which will help solve a Victorian murder. To achieve this aim, you must examine a wide range of sources of information such as



records, diaries, memorials in churches and listen to the gossip.

In the first part you have to compile the basic facts from archival material. You have access to contemporary material in the second part, and with this you attempt to form a case against the murderer. Two further parts provide further information and guide your findings.

In the second package, the pupil has to explore a Kentish village and map it. The final aim is to compile as much information as possible about a family that lived there.

Overall, the main theme of the package is that there is a lot of material available which is used to explore the past and shows where it is found and how it can be used. The software is detailed and well thought out - the documentation is copious and extremely useful; providing teacher's notes and help for the pupils. The material is ideal for project work, both for groups of children and the individual. I believe that this software

is free provided that a blank disk or tape is used.

Revision Series

Finally, I received some sample extracts from a series, written by Software Horizons, whose software is very much of the subject summary/revision genre. The system uses a kernel of routines which perform some fixed actions on a database. The database is specific to each subject. The format is test only with choices made from menus.

Each topic has a block of notes occupying two or three screen loads, which must be read in conjunction with normal notes. There are then a number of questions aimed at testing the pupil's knowledge. These are: Single question; these simply require a typed answer to a question. Multiple choice; three possible answers are given for the pupil to choose from. True or false. Group questions; answers are chosen

from a given selection to answer a group of questions.

Time test

700 paragraphs, the pupil has to insert the revision keywords into a paragraph.

A nice touch is the program's ability to tolerate minor deviations in spelling. Overall this package does its job well, but due to the lack of graphics, is rather uninspiring.

Final Words

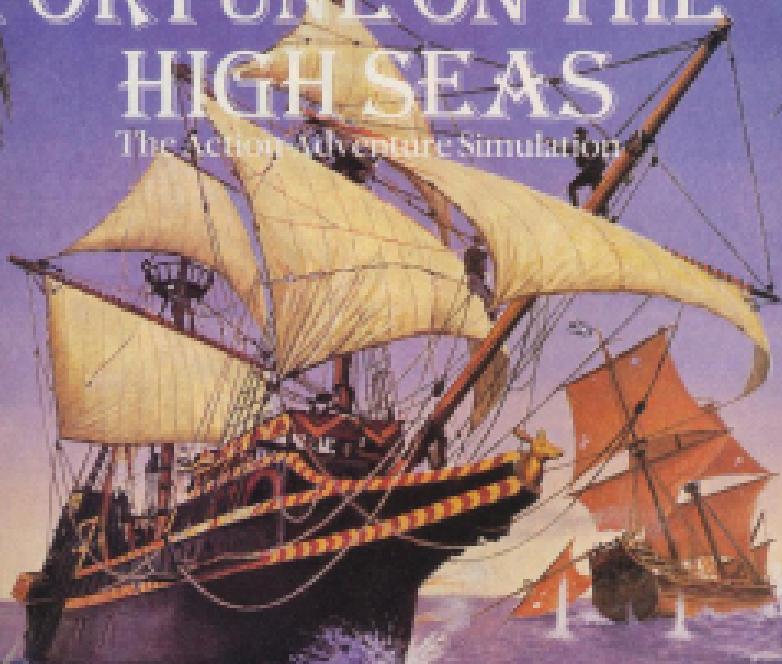
Price: £14.95 £16.95 Mathematics.
Supplier: Adelphi, 18 Newark Avenue, Rockdale, London SE11 3EZ.
Price: £12.95.

Title: History Revision. **Supplier:** Mr. C. Cowling, Durcan House Finch Farm, Durcan House School, Stanhope Road, Aughton, Lancs. PR9 1JZ. **Price:** £10.00/£12.00.

Title: Revision Series. **Supplier:** Software Horizons, The Mall Centre, Main Street, Wicklow Town, Co. Wicklow. **Dir. Price:**

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Enlarging the C64

Create User Definable Graphics to produce enlarged characters on your C64.

By Adam Wright

The program will enlarge any character up to a maximum square size of 192x192 by 8 pixels. In fact, as long as the combination of width and height when applied to the formula $\text{width} \times \text{height} + 1$ is less than 256 then other size combinations can be created. If you can take into account the massive amount of memory that is used when creating enlarged characters then I'm sure that you will appreciate that the size combinations available are very acceptable.

The program creates UDG's (User Definable Graphics) which when placed together in the correct order will produce the enlarged character. This program therefore works in the normal low-res screen mode. One advantage of this method of creating enlarged characters is that no extra screen areas have to be assigned. The disadvantage of this method is that the total number of characters definable must not exceed 256. One way to overcome this limitation is to create the enlarged characters that are going to be used beforehand.

Getting it all in

In order to enter correctly the Enlarge program the following steps have to be taken:

- Enter program 1.

• Run the program making sure there are no errors.

• Save the program (SAVE "PROGRAM 1",1)

• Save the code by typing SYS 49633 "ENL_CODE" 49162,49877,1"

• Enter program 2.

• Save the complete program (SAVE "ENL_APP",1")

• Disk Users replace the 1 with an 8

How to use the routines

Enlarge Character

This is the main routine which as its name suggests, enlarges characters. Routines that must be called before calling this routine are:

Data Store, Character Data, Width, Height

SYNTAX - SYS EC

Print Character

This routine puts the enlarged character on the screen. Note that the decimal point location could not be used because as you well know, some ASCII codes do things like clear the screen, etc., therefore the characters are "POKE'd" into screen memory.

Routines that must be called before calling this routine are:

Character Colour, Base Character,

XY Position, Width, Height

SYNTAX - SYS PC

Data Store

This routine is used to set up the address for the enlarged characters - (default 12280)

SYNTAX - SYS DS, enlarged character address

Character Data

This routine tells the computer where the 8 bytes of character definitions are - (default 14136)

SYNTAX SYS CD, character definition address

Character Colour

This routine simply changes the current enlarged character colour.

SYNTAX - SYS CC, colour of character

Base Character

This routine changes the initial character that is used as the base for the Print Character routine. (See example 1)

SYNTAX - SYS BC, base character number

XY Position

This routine changes the enlarged character coordinates.

Not to be confused with CURSOR MOVE

SYNTAX - SYS XY, X coordinate, Y coordinate

Width and Height

This routine sets up the width and the height of the character to be enlarged.

SYNTAX - SYS WH, width of character, height of character

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screen of the VDC quite easily, but you have to remember BASIC isn't prepared for this, so you may have to write specialist routines to make this possible. First let's try to make the screen smaller horizontally by:

POKE 54784.1:POKE 54782.75

The number of characters displayed has changed to 75, but it doesn't quite work because the spare two columns are printed on the next line. So we need space two to eight 25.

POKE 54784.27:POKE 54782.5

This solves the problem by adding five lines to make the total equal 75+5=80. The maximum number of characters is 80. We can also change the number of vertical characters using register 6:

POKE 54784.6:POKE 54785.10

No problems this time. The rest of the screen is swallowed up - even though it is still there if you type 25 in register 6. Now try this:

POKE 54784.6:POKE 54785.25

Wow! We now appear to have 16 lines, although they can't be used yet, and probably contain garbage. In fact we can have up to 32 lines although some monitors may not be able to display them all, so it's best just to add a few. Also, if you change the size of the screen it would be useful if you could centre the display. Well, you can of course. Just use registers 2 and 7 to change the horizontal and vertical sizes respectively. It's best to experiment and I would recommend that your programs that change the size of the screen allow individual users to alter the values for their individual monitors.

Like the 80 column screen, the 80 column has an attribute memory, but it's more added features. Each of the 2000 bytes (see Fig 6) affect the corresponding byte of screen RAM. The individual bits mean:

(see Figure 31):

bit 8 indicates which character set is in use.

bit 9: Reverse characters, but not used by ROM BASIC.

bit 10: used to underline characters (CTRL B).

bit 11: This bit flashes characters on and off.

bits 0 - 3 are used for the sixteen colours.

It is also possible to change the position of the screen and the

Figure 5

Copying the VDC RAM from place to place. Store the destination address at 250 and 251, the number of bytes in Acc. Also, store the source address in 252 and 253.

| | | |
|------|-----------|------------------------------------|
| copy | PLA | Jump over number of bytes than set |
| | LDX #24 | /bytes than set |
| | JSR read | /copy |
| | ORA #28 | /bit |
| | JSR write | /and write |
| | LDX #18 | /start |
| | LDA 251 | /destination |
| | JSR write | /Address |
| | INX | /high |
| | LDA 250 | /then |
| | JSR write | /low |
| | LDX #12 | /start |
| | LDA 253 | /source |
| | JSR write | /Address |
| | INX | /high |
| | LDA 252 | /then |
| | JSR write | /low |
| | PLA | /get number |
| | LDX #30 | /of bytes |
| | JSR write | /and done |
| | RTS | /return |

Figure 6

VDC RAM organisation

| | | |
|--------|----------|--|
| \$0000 | - \$0FFF | Video RAM, 2000 bytes. |
| \$0F00 | - \$0FFF | Not used. |
| \$0000 | - \$0FFF | Attribute RAM, 2000 bytes. |
| \$0F00 | - \$0FFF | Not used. |
| \$2000 | - \$FFFF | Character RAM, 8000 bytes. two character sets, 16 bytes per character (if not used). |

Figure 7

Altering underline scan line.

```

10 graphic 3,1
20 for i=0 to 24
30 char. 24,lchr(21)"How is underline test
on the VDC"
40 next i
50 do
60 for j=1 to 8
70 spoke 54784.24*res "register 28"
80 spoke 54785.1
90 for d=1 to 25 RPN "delay loop"
100 next d
110 next i
120 loop

```

atributes, as long as you tell the interpreter, which gets the information from a screen about BASIC screen page. You will need to do this if you enlarge the screen. You change these two locations 12 and 13 between 20 and 21 (atributes) of the VDC.

For those proud owners of monochrome monitors you can do away with the attribute altogether and use register 26 for the foreground and background colours. To do this you must clear bit 8 of register 29:

Poke 54784.13:POKE 54785.7

No difference? Well, not yet, but try the program from figure eight. Removing the attribute also allows you to release more memory for anything else.

Another feature of the VDC is the ability to change the size of the characters. This could be used as a special effect or just to annoy your friends! The registers controlling the size of the characters are 22 and 23 (bits 9-8). However, at present the system can only display up to a maximum of 8 by 8 pixels. But there are 16 bytes per character in the RAM so does this mean that a larger grid is possible? Try this:

```
1 POKE 54784.9:POKE 54785.13
2 POKE 54784.0:POKE 54785.14
3 POKE 54784.23:POKE 54785.12
4 POKE 54784.4:POKE 54785.19
5 POKE 54784.7:POKE 54785.18
RUN
```

So, it is possible to display an 8 by 16 grid, but what about 16 by 8. I'm afraid I haven't figured out how to do this, and I don't think it's possible.

Remember smooth scrolling on the VIC, well it's also possible on the VDC, using registers 24 and 25 for vertical and horizontal scrolling respectively. Notice that 16 bits can be scrolled in the horizontal plane. It has 4 of register 24 and that only 22 bytes (as opposed to 24) are displayed so you can scroll the next three on. Also, you don't lose bytes when scrolling on the VDC, try the program in figure nine.

The cursor is, as mentioned before, controlled by the VDC and has several registers controlling it, namely 14, 15, 16 and 11. Registers 14 and 15 define the address the cursor is at. Register 16 bits 3 & 6 indicate the cursor mode:

- 00 - The cursor is off,
- 01 - The cursor is on,
- 10 - Fast blinking,
- 11 - Slow blinking.

Bits 0-4 indicate the type (as of the cursor, because you can define it as underline, overline, solid, or anything you like). Register 11 defines the end

Figure 8

Changing the character size.

```
10 graphic 2.1
20 input "What is your name?"$name
30 echo "- "
40 n$=2000/len($name)
50 scroll
60 poke 54784.22:poke 54785.112
70 poke 54784.23:poke 54785.0
80 for i=1 to n$%
90 print $name;
100 next
110 for n=1 to 30
120 for r=0 to 8
130 poke 54784.22:poke 54785.112+n
140 poke 54784.23:poke 54785.0
150 for d=1 to 20
160 next d,n,r
170 sleep 3
180 end
```

Figure 9

The VDC scrolling registers.

```
10 graphic 5.1
20 fast
30 for j=0 to 24
40 char,27,"Hello all you C128 owners!"
50 next
60 do
70 for m=0 to 7
80 poke 54784.24
90 poke 54785.22+m
100 for n=0 to 60
110 next d,j
120 loop
```

Figure 10

The cursor mode.

```
10 fast
20 poke 54784.11:poke 54785.3
30 for n=0 to 66 step .02:rem "bits 5 and 6"
40 poke 54784.11:poke 54785.2+n
50 for o=0 to 79
60 poke 54784.10:poke 54785.0
70 poke 54784.15:poke 54785.0
80 for t=1 to 20:rem "change delay to suit
yourself"
90 next d,o,t
100 end
```

scan line. Both are from 0 to 15. See Figure 11 for an example of the cursor modes.

And now we come to the highlight of this article. Want to know a secret? HIGH RESOLUTION GRAPHICS? Yes, bit 7 of register 29 defines text or graphics mode and normally the hires mode is 640 by 200. This is comparable to the BBC mode 0 graphics, and is quite impressive. However, you will have to write your own graphics routines as Commodore forgot, although I saw a package at a Commodore show which could handle hires graphics in 80 column mode. Try this:

PORKE \$4784.25 POREKE \$4785.135

However, if you want to use 96084 bytes instead of 10000 then try this:
 1 POREKE \$4784.0 POREKE \$4785.64
 2 POREKE \$4784.2 POREKE \$4785.66
 3 POREKE \$4784.3 POREKE \$4785.68
 4 POREKE \$4784.7 POREKE \$4785.70
 5 POREKE \$4784.9 POREKE \$4785.72

This gives graphics of resolution 912 by 256. I use this a lot more because you can use a technique used on the BBC. Remember registers 12 and 17. Append this to the above program:

6 D00
 7 P0R8 T#0 TO #STEP 2
 8 POREKE \$4784.12 POREKE \$4785.12
 9 P0R8 W#0 TO #NEXT X.T
 10 L00P

What this program does is move the start of the screen, and as the screen takes exactly 96K bytes there it will wrap around in memory. This is a great feature and scrolling becomes easy. The procedure should be to change the start of the screen instead of scrolling memory, which makes scrolling easy and quick. Also, if Commodore had thought to give the VDC some more memory (guaranteed), say 12K bytes then it would have been possible to have displayed 640 by 400 or 320 by 512 pixels resolution using the interlaced graphics mode on register 8. Try poking 255 to this register!

Well, that's all I have to say about the VDC, and I assure you that there is a lot left to find out, and special effects to find. One final possibility that I thought about was to use the 96K bytes as storage for music data, etc. Also, you can use the VDC in 64 mode (as well as the 2 MHz mode). For other information on the VDC refer to one of the good C128 reference guides or *The Anatomy of the Commodore C128*.

Figure 11

A complete list of the VDC registers.

| | | |
|----|-------|---|
| 0 | (128) | total number of characters/line including beam return. |
| 1 | (88) | Number of characters displayed across screen. |
| 2 | (182) | Left border sync. Increasing this register moves the screen left. |
| 3 | (73) | Character width. Bits 0-3 determine hor. sync pulse width in characters, bits 4-7 determine vert. sync pulse width. |
| 4 | (88) | Total number of lines including beam return. |
| 5 | (254) | First adjustment for register 4. |
| 6 | (25) | The number of vertical lines displayed. |
| 7 | (32) | Upper border sync. Increasing this moves the screen up and decreasing it moves the screen down. |
| 8 | (252) | This register determines the interface mode. |
| 9 | (231) | Bits 0-6 determine the number of raster lines/character minus one. The default is 7 (bits not used appear as 1) minus 8. |
| 10 | (180) | Bits 3-6 set cursor mode and bits 0-3 set cursor start address. |
| 11 | (231) | The line at which the cursor ends is held in bits 0-4 (normally 7). |
| 12 | (89) | The high byte of the address of the screen. |
| 13 | (89) | The low byte of the address of the screen. |
| 14 | (171) | The high byte of the cursor position. |
| 15 | (77) | The low byte of the cursor position. |
| 16 | (FFF) | The vertical address of the light pen. |
| 17 | (FFF) | The horizontal address of the light pen. |
| 18 | (FFF) | The high byte of the address to be copied, written to or read from. |
| 19 | (FFF) | The corresponding low address of REG 18. |
| 20 | (89) | The high byte of the attribute screen. |
| 21 | (89) | The low byte of the attribute screen. |
| 22 | (120) | Bits 4-7 determine the number of displayed horizontal lines (7). Bits 0-3 determine the number of vertical displayed lines (8). |
| 23 | (232) | Number of vertical lines displayed height. |
| 24 | (32) | Bit 7 tells VDC whether copying, reading or writing. Bits 6 to 4 are the REG8-bit, used by <ESC = R and <ESC = M. Bits 4 onwards up for last three lines of text are vertically. Bits 0-3 are used for vertical scrolling. Bit 7 indicates high or low res. mode. Bit 6 indicates the use of attributes. Bit 5 determines non-graphic operating mode. Bit 4 indicates double width characters. Bits 0-2 are for horizontal scrolling. |
| 25 | (71) | When in microdisplay mode bits 6 to REG 2N, bits 0-2 determine background colour, and bits 4-7 indicate foreground colour. |
| 26 | (140) | Character base address (bits 3-7) in 8K steps. |
| 27 | (09) | The number of characters added to the end of each line. If you make the screen smaller you must make sure REG 1+REG 2=8. |
| 28 | (47) | Characters which lie underline, and can be from 0-15. |
| 29 | (231) | Number of bytes to be copied or stored. |
| 30 | (FFF) | Holds data for reading or writing to RAM. |
| 31 | (FFF) | High byte of start address of block to copy. |
| 32 | (FFF) | Low byte of start address of block to copy. |
| 33 | (FFF) | Number of characters from start of line to first character to be displayed. Can be used to cover left edge of screen. |
| 34 | (125) | An REG 24 but for right edge of screen. |
| 35 | (145) | Bits 0-3 indicate the DRAM refresh rate. |

Array Display Subroutines

Create a screen input and display routine which acts on string arrays, with this handy program.

By Paul Williams

When writing business packages or other programs for various applications, it is often necessary to have screen layouts containing a lot of data all at the same time (for example one record in a database program or the description of one item in a stock control package).

The best way of entering and modifying the data is for the user to be able to move a cursor around the various fields on the screen, using the screen editor to amend the data. However, the cursor must not be allowed to stray outside each field, otherwise it would be very easy for the user to corrupt the screen, and if the user were not familiar with computers, become very confused.

The program described here is a screen input and display routine which acts on string arrays, providing the following advantages over the normal BASIC INPUT command, while still being easy to use:

1. The programmer defines the field positions and sizes on the screen, and it is impossible for the user to enter out of these fields when editing.
2. When editing, the current field is highlighted to show the user the maximum size of entry expected by the program.
3. Left and right cursor controls, home, clear and insert and delete can all be used when editing, but only affect the current field, even if other fields are present on the same screen line.
4. Up and down cursor movements automatically move the user to the previous and next fields on the screen.
5. Apart from the allowed control characters, only letters, digits and characters such as ! and @ etc are accepted.
6. Quotes, commas and colons are all readily accepted as legitimate input characters, and do not cause #XTRA IGNORED errors.
7. The programmer can specify that editing is restricted to one particular field, or all the fields on the screen.
8. All the fields on the screen can be displayed at once with one command. Also, editing the whole screen is performed with just one command.
9. The whole system produces very neat screen displays, allowing editing to a professional software standard.

The program relies on three one-dimensional arrays for its operation; a field position integer array P%, a field length integer array L%, and a data array \$% containing the information to be displayed and modified. The array names are arbitrary - you can use any letters, but the two numeric arrays must be integer.

Array P% contains the displacement of each field from the top-left home position on the screen, e.g. the first column on the second screen line is a displacement of 48 from the top, and the middle of the bottom line is 984. Thus, P%(1) defines the location of field 1, and P%(2) defines that of field 2.

Array L% defines the maximum length of each field - this number determines the size of the highlighted area on the screen and the number of characters strings are truncated to when being displayed by the routine. L%(1) contains the length of the first field, and so on.

It is also necessary to set L%(0) to the number of fields present on the screen.

Array \$% simply contains the ASCII strings of data to be displayed; the routine directly modifies the elements of \$% when editing is taking place.

Once the areas have been defined, the subroutine is inserted in this way:

```
SYS49152.P%(1),L%(1),$%
```

For whichever array name you have chosen displays the elements of \$% in their respective fields.

SYS49152.P%(0),L%(0),\$%

allows the user to edit the data in the fields on the screen. The user can move between fields with the cursor up and down controls, and when RETURN is pressed the data in the fields is put back into the elements of array \$%. Editing and movement can be restricted to, say field N by P%(0)=N before the above SYS command. If P%(0)=0, editing is allowed in all the fields.

SYS49152.P%(0),L%(0),\$%

clears all field areas on the screen.

The main advantage of this system over normal INPUT's is that if the user has a lot of data to enter on the screen, it is possible to get to the end of the screen, then decide the top record needs modifying, and the cursor controls can be used to skip across the fields to reach that field. The Basic program is held up until the user is completely satisfied with the whole screen, then has/she presses RETURN and all the data is returned to the Basic program or vice versa.

The machine code program occupies locations \$C000 to \$C03B, and a Basic loader is listed. This contains checks which will point out typing errors when this program is run. Once the program has been installed using this loader, your Basic program can make full use of the package. To demonstrate how the routine is used, a Basic program has been included which draws up a typical stockcontrol screen and allows full-screen editing restricted to the defined fields. The program is fully commented and should need no further explanation.

The routine is ideal for taking the struggle out of writing business-type packages - after all databases and such like can quite easily be written effectively in Basic, as long as a toolspeed and ready to use input routine is available - this program provides just that!

See Ratings on page 29.

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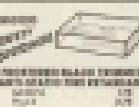
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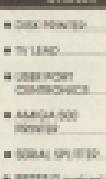
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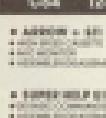
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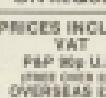
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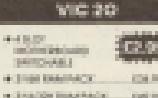
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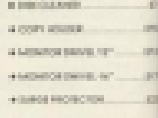
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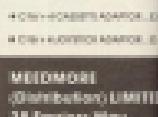
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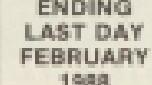
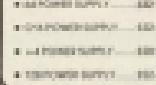
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C64 Tape System

Provide a menu driven access to multi-program library tapes with this handy program.

By Richard Kyme-Wright

Have you ever put more than one utility or backup program onto a single tape? Have you then forgotten to move the tape counter setting at the start of the second program and had to fumble around on tape looking for it?

Unless you are one of the obsessives, or you rigidly use one tape per program, this utility is for you.

The program offers a selection menu of the titles of programs stored on the tape. When a selection has been made, the tape will be spooled to the start of the selected program and the LOAD sequence commenced.

The difference between this tape-accessing system and any other I have enumerated is that there is no need to REWIND the tape to the beginning for a fresh look at the menu. The auto-select between the programs means that it is ready to use at any time.

Tape Layout

When you have loaded a program the tape stops at the end of that program and before the start of the next. This is the perfect spot to find a menu. From this menu, any other point on the tape can be reached by spooling fast forwards or using rewind. A menu is also placed at the start of the tape to act as a "registration" point that you can easily find if you do manage to get lost.

Limitations

The C64 tape system is only effective when a tape is being used as a library for your routine programs and utilities. These programs must all be set up on the tape before the tape system is added. To change the content of the tape or to update a program involving a change in its length would corrupt the layout on the tape and a new tape would have to be set up.

The system can accommodate as many programs as the tape can hold. During the setting up, however, the more programs you have associated onto a tape the greater the number of

spool-time intervals to be measured will be, and the necessary increase in data statements will make the menu programs longer to see and take longer to load.

The spooler has been constructed to occupy a minimum number of bytes (2444 bytes for the six title versions.) This takes 62 seconds to load normally but can be cut to as little as ten seconds when using a fast-spooling program or using cartridge (10 seconds to "load" when I use Final Cartridge II).

The spooler will clear off by investigating the normal loading commands of the C64 when the tape has been spooled to the correct position. The method of calling the next program can be tailored to meet individual program requirements. See Figure 1 for details of this.

Setting up the tape

Type in and "Save" the two programs listed here. Note that these are two separate programs and not two parts of the same one.

Place a good quality audio cassette in your 251 cassette unit and reset the counter to 000. Use fast forward to advance the tape past the leader strip, give yourself some spare tape at the start so stop it at a convenient reading of, say, "40M". There should be enough tape spooled to save the "titles" or "spooler" programs at the start of the tape and not run past this point. At "000" use the first program in your library. Note the counter value at the end of the "save" then use "play" to move the tape forward for "70" seconds to leave a space to save the spooler later.

Use an appropriate shorter time interval if you are utilising a fast-spool utility. The tape is now at the start point for the next library program. Build up your tape in this manner until you have the required number of programs on the tape, and leave enough room at the end of the tape for a final spooler program.

Now I recommend that you rewind

the tape, reset the counter and load each program in turn. Check that the programs load alright and that the counter values agree with your notes. Note that the true start point for each program will be 70 seconds (or less) beyond the end of the previous program and not at the point where your C64 announces to you that it has found something.

You now have all the information you need to measure the time it takes the cassette drive to spool between any two of the start settings.

Running the timer program

The TIMER program has to be used at the very start of the tape. Instructions on its operation are displayed as you go along. Follow as directed and make the necessary notes on the spooling times chart. Remember, read the tape counter while the tape is being spooled, press space bar as it approaches the required value as the tape will overrun slightly when switched off. This will take a little practice to get right.

Use the chart layout as suggested in Figure 2 to avoid getting lost between the different programs on the tape. Record the timer values obtained from a rewind as negative values and those from fast forward as positive values. Note that the last line of the chart is set with all negative values. This records the rewinding time to reach the start point of each program from the forward end of the tape. This point is 70 seconds of "play" time (or less) beyond the end of the last program. Make a record and refer to Figures 2 and 3 for more details.

Setting up the spooler program on the tape

When your chart is complete (LOAD the spooler program (do not RUN it) as it will reset itself with NEW when it finishes). List out line 68 and replace

the next found within the quotation marks with the general rule for this tape. Overtype the last three parts (RETURN). Do not use the INSERT or DELETE key as the layout of the screen would be corrupted.

Overtype the text in the data statements beginning at line 74 with your program titles in their order on the tape. This is the point where you can take the speaker program to the actual contents of your tape.

If the number of titles is six or less use lines 74 to 80 as given in the listing. Type in all six titles etc., if less than six, put in spaces of text on the unused data lines. Select the appropriate method of loading each program from the chart in Figure 1, and put the relevant code into each title line after the comma. Take the three line of numbers from your chart of speed times and type them over the "40000"s in line 80.

Your data lines should look like this for four titles:

```
74 DATA" 1: PROGRAM TITLE
ONE "1
75 DATA" 2:TITLE OF PROGRAM
TWO "2
76 DATA" 3: HERE IS PROGRAM
THREE "3
77 DATA" 4: PROGRAM FOUR "4
78 DATA" " "
79 DATA" " "
80 DATA+40000,+03400,+0732,+19
21,+0008,+0000
or this for six titles
74 DATA" 1: PROGRAM TITLE
ONE "1
75 DATA" 2:TITLE OF PROGRAM
TWO "2
76 DATA" 3: HERE IS PROGRAM
THREE "3
77 DATA" 4: PROGRAM FOUR "4
78 DATA" 5: THE FIFTH
PROGRAM "5
79 DATA" 6: PROGRAM NUMBER
SIX "6
80 DATA+40000,+03400,+0732,+19
21,+1760,+2121
```

If more than six titles are required use line 78 (one six) for the NEXT SELECTION option and set the code at the end of the line to "W". This triggers the program to the next page of titles.)

Re-type the data lines as in lines 74 to 80 starting with the new line number of 81.

But six must again be the NEXT SELECTION option and if this is the last page, set the code at the end of the line to "W". This makes the display revert to the initial selection.

```
74 DATA" 1: SOUND CREATOR      ".2
75 DATA" 2: SOUND MAKER        ".2
76 DATA" 3: SOUND SEQUENCER    ".2
77 DATA" 4: MUSIC THEMES ALBUM ".2
78 DATA" 5: MUSIC HITS ALBUM   ".2
79 DATA" 6: -----NEXT LIST-----.8
80 DATA+7550,-0000,+0100,+1630,-02400,+0000
81 DATA" 1: MELODY TIME, POP HITS ".1
82 DATA" 2: SYNC. SYNTH. CLASSICS ".1
83 DATA" 3: TUNES FOR YESTERDAY ".2
84 DATA" 4: TUNES FOR TOMORROW ".2
85 DATA" 5: TUNES FOR TODAY    ".2
86 DATA" 6: -----NEXT LIST-----.8
87 DATA+3170,+0320,+0670,+0310,+0000,+0000
```

In the second example I have gone a stage further and used eleven titles spread over three pages!

```
74 DATA" 1: SOUND CREATOR      ".2
75 DATA" 2: SOUND MAKER        ".2
76 DATA" 3: SOUND SEQUENCER    ".2
77 DATA" NOTE ABOUT HARDWARE PUT HERE!! ".2
78 DATA"-----".0
79 DATA" 6: -----NEXT LIST-----.8
80 DATA+8100,-0240,+0000,+0300,+0300
81 DATA" 1: MUSIC THEMES ALBUM ".1
82 DATA" 2: MUSIC HITS ALBUM   ".1
83 DATA" 3: MELODY TIME, POP HITS ".1
84 DATA" 4: SYNC. SYNTH. CLASSICS ".1
85 DATA"-----".0
86 DATA" 6: -----NEXT LIST-----.8
87 DATA+1820,+2410,+3170,+0320,+0000,+0000
88 DATA" 1: TUNES FOR YESTERDAY ".2
89 DATA" 2: TUNES FOR TODAY    ".2
90 DATA" 3: TUNES FOR TOMORROW ".2
91 DATA" 4: TUNES THAT NEVER WERE ... ".2
92 DATA"-----".0
93 DATA" 6: -----NEXT LIST-----.8
94 DATA+4570,+5210,+3170,-1670,+0000,+0000
```

Figure 2: chart layout for recording
Tape values

Figure 3: the options available to the speaker when it hands over to the LOAD sequence.

| CODE | LIN# | Produces the following response | |
|------|------|---|--|
| 1 | 60 | Hold down Shiftkey and press RUN/STOP 'READY' | line to create an AUTORUN command when loading BASIC) |
| 2 | 60 | LOAD" (L) <return> | internal LOAD command) |
| | | PRESS PLAY ON TAPE | |
| 3 | 62 | LOAD" (L) <return> | for use with programs saved using the 'Save' or 'Tape' facilities of Final Cartridge II) |
| 4 | 63 | | |
| 5 | 64 | | |
| 6 | 65 | | |
| 7 | 66 | | |

Space is available in lines 60 to 66 to define any other load variations you require.

Of course, if your list of titles continues, lines 80 to 87 will be filled and the block of lines 11 to 16 can then be repeated again on new lines 88 to 94.

Here are two examples adapted from one of my own applications. In the first there are ten titles on the menu and option six on each 'page' is used to turn to the list on the next 'page' (or to go back to the first 'page').

In this second example I have gone a stage further and used eleven titles spread over three 'pages'.

It is important to note the timer values are not in sequence in lines 80, 81 and 84 as the titles have been grouped by subject and not by the position on the tape. Each timer value must correspond to the program title in the list that owns it. (Type in these data lines and run the program to see how it handles them. Change the `POKE` command in line 73 to a `STOP` command first or your experience will involve a lot of re-LOADS.)

With the data lines set up, save the speaker program using the fast-save facility (if you have one) at the appropriate position before the start point of the first program. Next speed forwards to the end of that program, using the tape counter and your notes for guidance.

Load speaker to your screen then overtype the timer values (lines 80, 87 etc.) with the second set of figures from your timing chart then **SAVE** speaker at the tape position you have now reached.

Continue this process until speaker has been saved between each program on the tape and save once after the last program using timer values that are all one.

Begin with the tape positioned at the start of one of the programs by setting the tape to the tape counter value noted for that program on the left of this chart; speed to the start point of a program listed along the top, and record the timer value displayed by the speed timer program in the appropriate box on the chart. See Figure 2.1 for an example.

This chart can be expanded to accommodate any number of programs in lines as there is one column per program and one line more than the number of columns.

Figure 2.1: This is an example of the chart when partly filled in. The top and left side of the form is used for noting

Figure 2

| PROGRAM NUMBERS | 1 | 2 | 3 | 4 | 5 | 6 | | TIMER VALUES |
|--------------------|---|---|---|---|---|---|--|-----------------|
| | - | - | - | - | - | - | | |
| 1 | - | - | - | - | - | - | | |
| 2 | - | - | - | - | - | - | | |
| 3 | - | - | - | - | - | - | | |
| 4 | - | - | - | - | - | - | | |
| 5 | - | - | - | - | - | - | | |
| 6 | - | - | - | - | - | - | | |
| 7 | - | - | - | - | - | - | | |

Figure 2.2

| PROGRAM NUMBERS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------------------|-----|-------|-------|-------|-------|-------|-------|-------|
| 1 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 2 | 100 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| 3 | 100 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| 4 | 100 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| 5 | 100 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| 6 | 100 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| 7 | 100 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| 8 | 100 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |

Timer - Process Description

| | |
|---------|---|
| Line | Description of process |
| 100 | Set up background and border colours |
| 110-210 | Paint screen layout |
| 220 | Deposit character or last position of screen |
| 230-300 | Display instructions on the screen, reset the keyboard register |
| 310 | Read keyboard character |
| 320 | If character=11... (EJECT) |
| 330 | If cassette "STOP" key has been used.... |
| 340 | If character < a space bar.... |
| 350-410 | Paint timer box on screen |
| 440 | Set up timer reference, start speeding the tape |
| 450 | Calculate elapsed time |
| 460-570 | Display elapsed time, 1000P until space bar is pressed |
| 580 | Stop speeding the tape |
| 590 | Display prompt "PRESS RETURN TO RESET TIMER" |
| 600-630 | Read keyboard character, respond to "RETURN KEY" and "T" |
| 640-650 | Display prompt "READY FOR NEXT" and reset timer display |
| 660-690 | Read keyboard character, respond to "U", "STOP", "SPACE BAR" |
| 700 | Reset timer value and go to line 450 (1000P) |
| 710 | BUZZ and FLICKER error procedure |
| 720-750 | Displays the error message |
| 760 | Exit from the program = END |

down tape counter values for the start point of each program present.
E.g. (in this example)

The next speed time to be measured is the one between the start of program four back to the start of program two.

The tape counter should show the

number "100". Press the rewind key and then the speed bar. Press the space bar again when the counter runs back past "37" to allow the tape to come to rest at "37". Note down the timer value in the box marked "T1". (I get a timer value of "0099" for this one.)

The Best of 1987

Whether you are looking for a present to buy or want to treat yourself, you'll find something in our list of favourites from 1987.

By Tony Hetherington

It's been a great year for games with more American giants turning up shop on these shores. Soon you won't have to wait for the latest game from Electronic Arts, Microprose, Origins or Infocom as they'll be released simultaneously here and in the States.

This top ten has been compiled by the marks given by the reviewers of each game of the month. For a full review check the relevant copy or contact our back issues department.

California Games/EPT X/16/32 Gold/DP/99 cass/£12.99 disk. The fifth and finest of the power games that started in Summer, passed through Winter and then went around the World. New California games takes you through six sun soaked sports that feature snowboarding, foot bagging, surfing, roller skating, BMX racing and finally trailer flagging.



Sentinel/Firebird/DP/99.

A battle of skill and strategy pits you against the mega absorbing Sentinel across a staggering 30,000 landscapes. Your aim is to get to the highest peak and absorb the Sentinel before it gets you.

The Last Ninja/System 3/DP/29.

In what must be the last word in martial arts games you have to punch, kick and kill an increasing variety of

opponents with a growing arsenal of weapons that are shown about the glorious graphic landscapes. If you're into combat games that get the Last Ninja, it beats the opposition.



Draul/Firebird/DP/99.

Draul was the best of the Gauntlet clones as it added the use of spells to top down scrolling adventure. Our hero has to battle with ghosts, basilisks and demons to reach chests that contain magic spells and poniagrams that replaced lost energy. When you opened a chest you were faced with a dilemma of which of the powerful spells you should choose. Should you collect more fire, water or electrical attack spells, grab a key or even the Colem, a faithful servant, that could be played by a second player? If you haven't got a copy of Draul yet, then there's no dilemma, buy one.

Copter/Microprose/DP/14.95 cass/DP/99 disk.

Copter took flight simulations to new heights with a combination of an easy to fly helicopter that boasted with weapons and an addictive gameplay that included flying over 100 missions throughout the war zones of the world. If you succeeded in wiping out enemy command posts, tanks, helicopters, gun emplacements and industry you could gain promotions and medals and progress to more during missions.

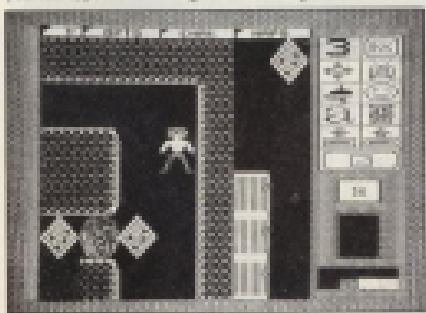
Stiffy and Co./Palace/£9.99 cassette/£12.99 disk.

Stiffy and Co. brought good eggs, cucumber sandwiches and well-upper lips to the night of adventure as four all-round heroes set off to a South American banana republic to stop some boulder-destroying the world. You'll have to keep a straight bat and wits sharpened if you're to survive the onslaught from Generals and other jungle types. Some of these can be solved with logic, others will need the old thinking cap.



Ripley/Micropac/£14.99.

A beat-em-up style of game in which you must collect diamonds and a golden crown to progress to the next level while avoiding plummeting rocks, hatching monsters and giddy ghosts. A great game if you can keep your nerve. If you can't, you'll soon be given a crushing blow.



Killed Until Dark/Associate/US Gold/£9.99.

Murder, mystery and mayhem lie in store as the Midnight in the Club bus just knocked into the hotel where you're the house cleaner, and they're all on to prove that they're the world's greatest murderer. Luckily, you're the world's greatest detective and with the help of security cameras and less subtle foisting in rooms, you just might solve the 20 cases supplied on the game tape or disk.



Player/Micropac/£14.99.

The fast, over-the-top hacking simulation takes you to the high seas as you take command (fight for command) of a pirate ship. From there you sail the seven seas in search of resources to plunder and ports to attack. You can opt to become all out pirates and steal from any ship or instead become a privateer and serve King and country which means you plunder ships from the rest of the world. A superb simulation that's easy to get into despite the daunting task of a 90 page instruction manual!



Gambler/US Gold/£9.99.

The pick of the coin-op conversions that gives you 312 dungeon levels to explore as you battle with ghosts, giants, ladders and sarcophagi. This excellent game is now part of US Gold's Solid Gold compilation which is this month's game of the month.

FOUR FEATURED ADD-ONS.

Are you happy with your computer system or do you want to stretch it a little further? If so, here are four add-ons that Your Computer has featured in the last year.

Accelerator +/Dataram/Micron/£159.99.

Electron Micros produced an alternative to the large and lumbering Commodore 1341 disk drive. The Accelerator + is smaller and slimmer, compatible with nearly all disk software, claims to be up to 25% faster and costs £40 less. *Telnet Adapter/Micron/£159.99.* Telnet is the information service that's broadcast alongside BBC and ITV programs. Until now you had to buy a

specially adapted TV to receive this information but thanks to the Microtel modulator you can see your C64. You can not only read the pages of news, results, reports and TV listings but also use the information in your own programs thanks to a screen reading utility, LOAD-IT!/Load-in/C12.95.

Available either ready fitted or as a kit for £10 less this little device could save you hours of anguish as you watch tapes not loading. By simply turning a predefined switch you can adjust the angle of the read head to your distance and load in nearly all those programs that you thought were unuseable.

Epsonsoft 64/Draft/Electronics/C19.99.

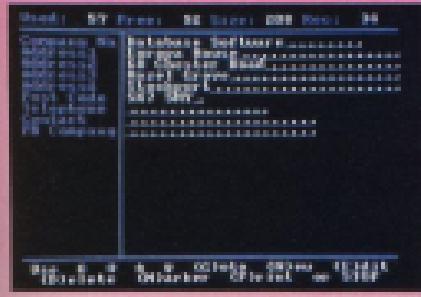
Together with Data's Cartridge Development system (C12.99) you can now create your own cartridges by simply loading your programs onto an Epson and then building it into a cartridge. Push your new cartridge into the C64, turn on and there's your program ready to use. With full, easy to follow instructions you can't afford to ignore Epson programming.

BUSINESS AND UTILITIES

More and more people are using their computers for more "serious" applications other than word processing, storing information or drawing exciting graphics. Here are ten programs that we have featured in the *Commodore* that will put your C64 to work.

Mini Office II/Database/C14.95 case/C19.95 disk.

Mini Office II is a package that represents excellent value for money as it includes a word processor, database, spreadsheet, graphing utility, colour pack and label printer all for the price of one. The menu controlled package is easy to use, fully compatible and a must for all users.



Stop Press/AMX Software/C19.95.

Available on its own or with the AMX mouse for £29.95, Stop Press is a flexible desktop publishing program that can take text from any PET ASCII file and then print it in a variety of fonts and combine it with a library of clipart. The results can then be printed out to form a newsletter or saved for later use.

Advanced Art Studio/Rainbird/C14.45 disk.

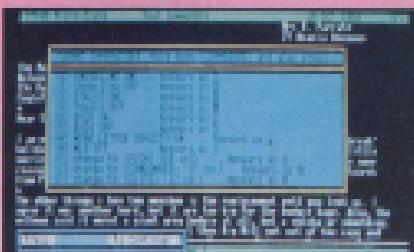
The Advanced Art Studio is the first of two graphics packages featured in this roundup. Based on the original window and pull-down menus of the Art Studio, it includes added features such as support for multi-colour mode, user

defined borders that can include four colours and can be 128x16 pixels big and loud, and scroll and scroll windows off the screen as easy to build up picture elements.



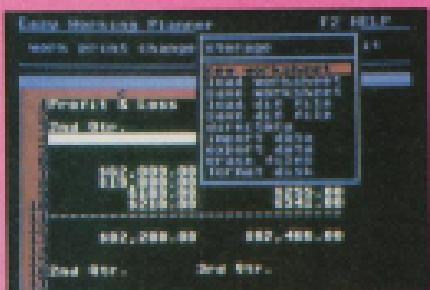
Micro-Check/PCL/C19.99.

A combined business package for the C128 puts this machine to work and makes an essential workplace for all small businesses. The package not only contains a word processor, spreadsheet, cash book and database but it can be expanded through extension packages that include a sales ledger, purchase ledger and payroll.



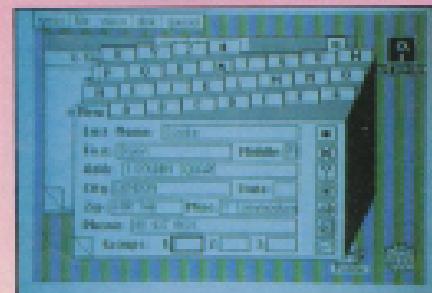
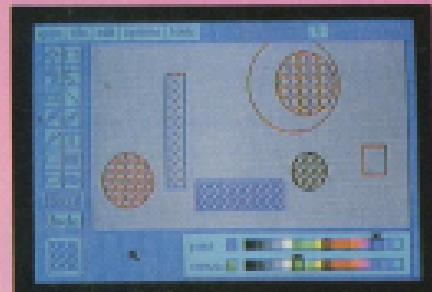
Logos 1/2/3/Logos/C12.99 each.

A trio of packages that have been tailor made for the British market from the American Spinnaker originals. Planner 1/2/3 is a particularly comprehensive spreadsheet program and is matched by Writer 1/2/3 and Filer 1/2/3, both for ease of use and value for money. Could this trio become the Lotus 1-2-3 of the C64 world?



Easy Mechanics Planner £19.95
Gems Extensions/Britley Software/Micronova
UK/29.95

GEOS, the Graphic Environment Operating System, disk operating system first brought windows and icons to the C64 earlier this year. Now though a new importer has now been joined by Writers' Workshop, Grottel, GameCalc and more fonts and diskedit utilities including a graphics grabber that can take Newsroom and Print Shop graphics.



Video Title Shop US Gold/£14.99.
A graphics package and a screen animator combine to form

a package that can be used for anything from a title page for the video of Fred's birthday to a full advertising drama. The text and graphics are created on screen where they can be animated in a variety of ways and stored either on disk or recorded onto a video.



The Image System/CRL/C24.95.

Described as one of the best graphic programs available for the C64 the image system uses the new standard method of joystick control and has a variety of menus from which you can draw, fill and colour shapes, as well as the unusual image menu that not only allows you to save, magnify and print parts of the screen but also distort and twist the shape into any other.



Blaster64/Information Development Systems/£29.98.
Blaster64 is an invaluable utility for basic programmers and allows you to write programs using existing subroutines that you have already written, tested and debugged on disk. When you've completed the program, Blaster64 pulls in the routines and remembers the program and presents a full on screen report including the start and end addresses and the number of modules used.

The Toy Shop/Precision Software/£19.99.
20 working toy models that can be printed out and then built are included on one disk, along with its full instruction manual and sundry extra components such as small pieces of card, rubber strapping and balloons. This may sound a bit like Blue Peter and a bit pointless but it is actually great fun. This could send the paper aeroplane industry to new heights. Ti

Listings

*Get it right first time with our deluxe program system
for the C64.*

You may have noticed that our listings are free of those horrible little black blocks which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. These numbers, it is a case of *one case entry*, aid

Instead of these many graphics and rows of countless spaces in PRINT statements and settings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an use of spaces in Feynman's terms, and [SA,10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realize that [C+2] means exactly the same thing except that the Command key (located left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [XXXXP4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:
[CTRL-N, DOWN2, LEFT3, BLUE,
ECHO]

The model is achieved by holding

down the CTRL key as you press N, press the cursor key down once, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2) would of course make the computer go into hibernation.

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

In this case the two characters should

have a comma between them.

On rare occasions [REVERSE T] will appear in a listing. This is a delete symbol and is created by starting the line up to this mnemonic. Then type a closing quotation mark [QUOTE-UP] at 12 and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key [KEYBOARD], type the relevant number of reversed T's and then hold down CTRL and press once [QUOTE-UP]. Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string. The symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

ZG-ZHUB

Ignore the square brackets and just type in a shifted upward pointing arrow (e.g. the pi symbol).

第十一章 财务管理

by Eric Drury



Checksum Program

The hexidecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get back right. Don't worry if you don't understand the hexidecimal system; as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk.

Immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and

press RETURN again.

If you want to turn off the checker simply type SYS#H32 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't set the area where Checksum has you can go back to it with the same SYS command.

Lower Case

Many of the listings are presented in lower case. To type your computer in lower case mode press the Commodore key and the SHIFT key at the same time.

| Mnemonic | Symbol | Keypress |
|----------|--------|-------------------------|
| [RIGHT] | | CTRL left/right |
| [LEFT] | | SHIFT & CTRL left/right |
| [DOWN] | | CTRL up/down |
| [UP] | | SHIFT & CTRL up/down |
| [P1] | | II key |
| [P2] | | SHIFT & II key |
| [P3] | | O key |
| [P4] | | SHIFT & O key |
| [P5] | | O key |
| [P6] | | SHIFT & O key |
| [P7] | | O key |
| [P8] | | SHIFT & O key |
| [HOME] | | CLR/HOME |
| [CLR] | | SHIFT & CLR/HOME |
| [RSVON] | | CTRL & I |
| [RSVOFF] | | CTRL & I |

| Mnemonic | Symbol | Keypress |
|-----------|--------|------------------|
| [BLACK] | | CTRL & 1 |
| [WHITE] | | CTRL & 2 |
| [RED] | | CTRL & 3 |
| [CYAN] | | CTRL & 4 |
| [PURPLE] | | CTRL & 5 |
| [GREEN] | | CTRL & 6 |
| [BLUE] | | CTRL & 7 |
| [YELLOW] | | CTRL & 8 |
| [POUND] | | \$ |
| [ARROW] | | - |
| [UPARROW] | | ↑ |
| [P%] | | SHIFT & % |
| [INST] | | SHIFT & INST/DEL |
| [REV T] | | REV TEXT |
| [Cleter] | | CRM + letter |
| [Sletter] | | SHIFT + letter |

LISTINGS

[View Details](#)

REFERENCES

REFERENCES

LISTINGS

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18 KEPF
20 KEPF-1 LOADER_2 *
20 KEPF-CHARACTER SET *
40 KEPF-CHARACTER SET *
2000 FUEL-070320-CR-0100E=0
3015 CRASH_CX-CR-A, FORECI E140
42-18-0, 18-0, 18-0
2018 CRASH_L1PM NORTHMORNING
ERROR IN LINE: 3000+(L180)=0
TOP
2020 CRASH_L1PM
2040 DATNO_0, 1, 2, 0, 0, 0, 0, 0, 0
2050 100, 100, 100, 100, 100, 100
1000
2050 DATA121, 100, 100, 100
100, 100, 100, 100, 100, 100
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Instructions for ordering non-m

- 11 Enter User privilege 'ALTERUSER'.
- 12 Grant this to Super user which is ID 101 in RDB 11.
- 13 Enter The Following command: PSQL11, PSQL12, ID=101, S=1, M=1
- 14 Now LOG in and Run "ALTERUSER" which will change the password. Then Follow the steps 1 to 6.

PEPPER, PETER, JR.

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www.english-test.net

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| 000/256 | | 756 | JMP 804H | 580 | ORG 804H |
| 510 | STA HI-VEC | 760 | DELETE DL | 510 | STA HI-VEC |
| TOS | | 0 LINE 750-800 | | 520 | INT 100H |
| 520 | LDA 804H | | | 530 | LDA 804H |
| R1 | | | | 540 | LDA 804H |
| 540 | LDA 804H | | | 550 | LDA 804H |
| PAGE | | | | 560 | LDA 804H |
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| 550 | JMP 804H | | | 630 | LDA 804H |
| 550 | JMP 804H | | | 640 | LDA 804H |
| 550 | JMP 804H | | | 650 | LDA 804H |
| AT FIELD INCREASE/DECREASE FOR Y0 | | | | 660 | LDA 804H |
| OR 804H | | | | 670 | LDA 804H |
| 600 INITIALISE2 | HOP | 18 | .ORG EC | 680 | LDA 804H |
| 610 | HOP | 000 | | 690 | LDA 804H |
| 620 | HOP | 75 | | 700 | LDA 804H |
| 630 | HOP | 76 | | 710 | LDA 804H |
| 640 | HOP | 77 | | 720 | LDA 804H |
| 650 | HOP | 78 | | 730 | LDA 804H |
| 660 | HOP | 79 | | 740 | LDA 804H |
| 670 | HOP | 7A | | 750 | LDA 804H |
| 680 | HOP | 7B | | 760 | LDA 804H |
| 690 | HOP | 7C | | 770 | LDA 804H |
| 700 | LDN 804H | 7D | | 780 | LDA 804H |
| 710 | STL BORDER | 7E | | 790 | LDA 804H |
| 720 | STA BORDER | 7F | | 800 | LDA 804H |
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| 740 | LDA 804H | 82 | | 830 | LDA 804H |
| 804/256 | | 83 | | 840 | LDA 804H |
| TOS | | 84 | | 850 | LDA 804H |
| 850 | LDA 804H | 85 | | 860 | LDA 804H |
| R1 | | 86 | | 870 | LDA 804H |
| 870 | LDA 804H | 87 | | 880 | LDA 804H |
| PAGE | | 88 | | 890 | LDA 804H |
| 890 | (NET Y0 C) | 89 | | 900 | LDA 804H |
| 8J FIL0 | | 90 | | 910 | LDA 804H |
| 810 | LDA 804H | 91 | | 920 | LDA 804H |
| 820 | STA BORDER | 92 | | 930 | LDA 804H |
| 830 | JMP 804H | 93 | | 940 | LDA 804H |
| PROGRAM: LISTING 1 | | 94 | | 950 | LDA 804H |
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| | | AV | | AW0 | LDA 804H |
| | | AW | | AX0 | LDA 804H |
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| | | CY | | CZ0 | LDA 804H |
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| | | DA | | DB0 | LDA 804H |
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| | | DJ | | DK0 | LDA 804H |
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| | | DO | | DP0 | LDA 804H |
| | | DP | | DQ0 | LDA 804H |
| | | DQ | | DR0 | LDA 804H |
| | | DR | | DS0 | LDA 804H |
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| | | EH | | EL0 | LDA 804H |
| | | EL | | EM0 | LDA 804H |
| | | EM | | EN0 | LDA 804H |
| | | EN | | EP0 | LDA 804H |
| | | EP | | EQ0 | LDA 804H |
| | | EQ | | ER0 | LDA 804H |
| | | ER | | ES0 | LDA 804H |
| | | ES | | ET0 | LDA 804H |
| | | ET | | EU0 | LDA 804H |
| | | EU | | EV0 | LDA 804H |
| | | EV | | EW0 | LDA 804H |
| | | EW | | EX0 | LDA 804H |
| | | EX | | GY0 | LDA 804H |
| | | GY | | HA0 | LDA 804H |
| | | HA | | HB0 | LDA 804H |
| | | HB | | HC0 | LDA 804H |
| | | HC | | HD0 | LDA 804H |
| | | HD | | HE0 | LDA 804H |
| | | HE | | HF0 | LDA 804H |
| | | HF | | HG0 | LDA 804H |
| | | HG | | HH0 | LDA 804H |
| | | HH | | HI0 | LDA 804H |
| | | HI | | HQ0 | LDA 804H |
| | | HQ | | HR0 | LDA 804H |
| | | HR | | HS0 | LDA 804H |
| | | HS | | HT0 | LDA 804H |
| | | HT | | HU0 | LDA 804H |
| | | HU | | HV0 | LDA 804H |
| | | HV | | HW0 | LDA 804H |
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B R E A H

Serious Users Guide Software

Apologies to anyone who experienced a delay in receiving the software from the Serious Users Guide. This was due to technical difficulties with the disk.

It is possible that some programs may have received a corrupted version of this disk. Should your disk not work correctly can you please return it to:

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T Graham Avenue,
Brentwood,
Essex SS6 2LA.

and a replacement will be sent to you.

Commodore Where Are You?

At the Four Commodore office we are repeatedly asked for the address and telephone number of Commodore U.K. Many people, after referring to their computer manuals, believe them

to be based in Corby.

The Commodore plant at Corby was closed down some time ago. Reproduced here you will find the correct address for Commodore U.K. We suggest that you write this correct address in the front of your computer's manual for future reference.

Commodore Business Machine (UK) Ltd.
Commodity House,
The Switchback,
Gardner Road,
Maidenhead,
Berks SL6 7JA.

Plus/4 Extended Basic

The author of the Plus/4 Extended Basic program that appeared in our 1987 Serious Users Guide has provided us with a number of updates to the program. All of the alterations are

made to Listing 1. The changes are as follows:

88 POKC DDDP"13AP"121
#651\$80F\$EXTENDED-BASIC".
1487,2805

A number of errors also appeared in the test for this program.

The line to be added should the first line to be used is:

93 LPD\$="T"THENSYSDEC
("300")

The RECORD format is incorrect. This should be:
RECORD CHANNEL,RECORD
(OFFSET)

The RECORD command also assumes that file 15 has opened as the command channel.

The EMERGE format is the same as the normal DLOAD command.

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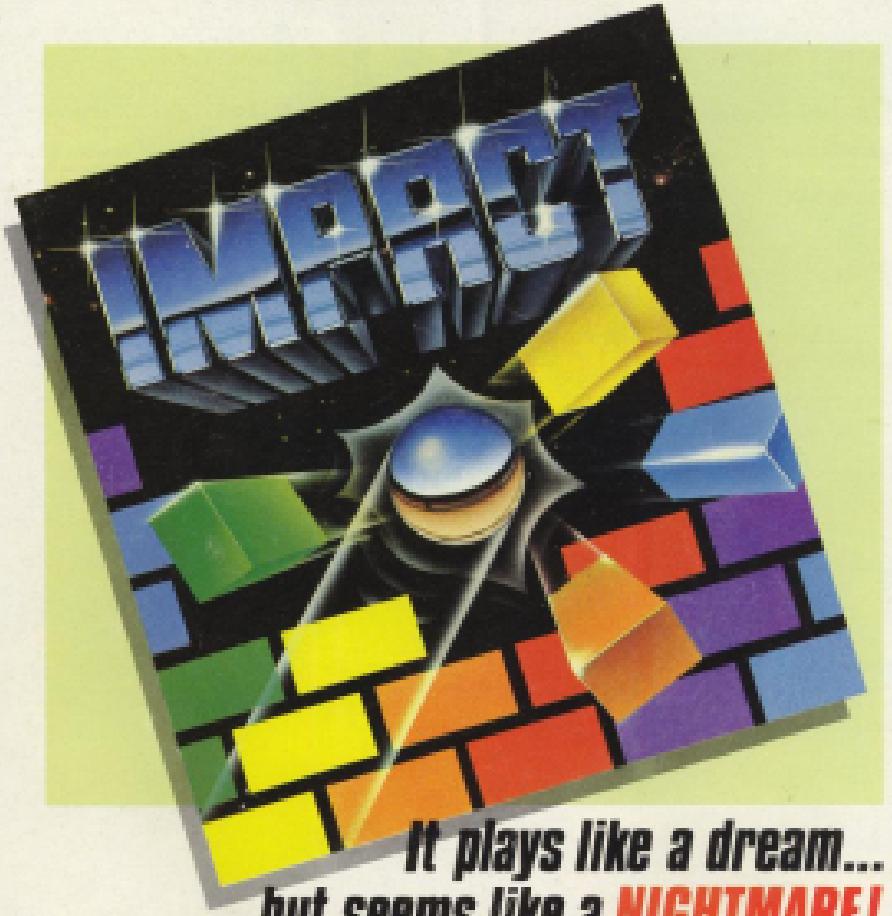
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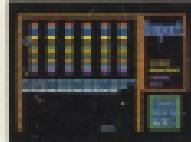
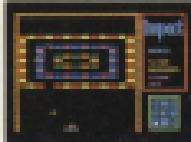
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and growing talents,
or by their great
and commanding
and useful services.



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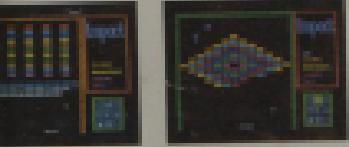
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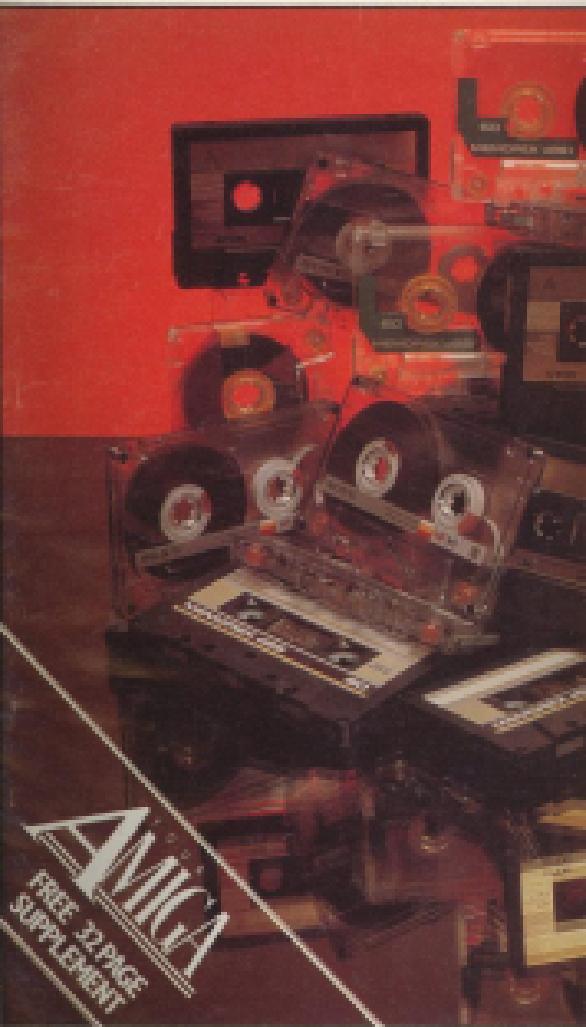
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Your Commodore, January 1990



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